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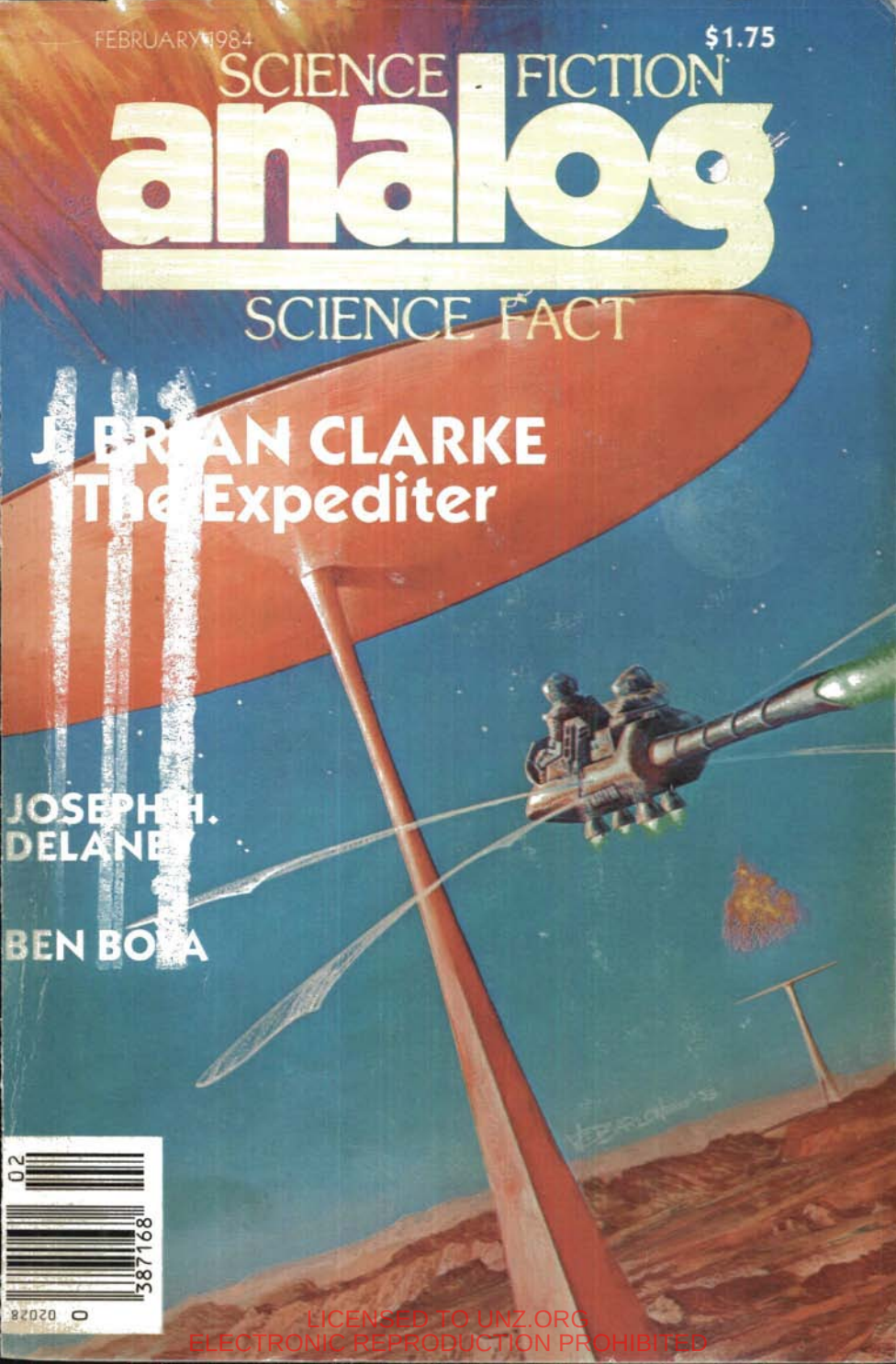

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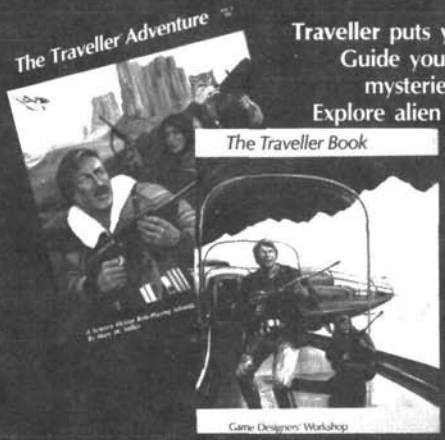

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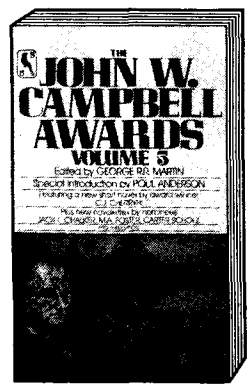

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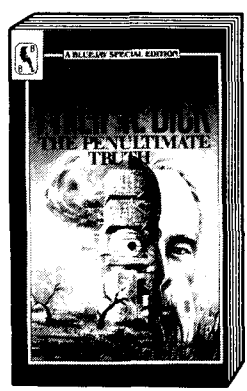

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Editorial

WHEN IS A SCIENCE?

Stanley Schmidt

Are physics and chemistry sciences?

Sure, you probably say. So what?

O.K. How about biology? Psychology? Economics? Parapsychology?

Each of these fields has students and practitioners who consider what they're doing "science." Most "hard" scientists, like physicists and chemists, would agree, with no more than minor reservations, in the case of biology. Many would balk at psychology or economics, and perhaps even more at parapsychology.

Why? Because science, as the term is understood by its more exacting practitioners, must not merely collect and describe data, but must describe them in terms of operational rules. Those rules must let anyone who understands them predict—correctly and verifiably—what will happen under circumstances not previously tested. Physics and chemistry can do that under a wide range of circumstances. Psychology, economics and other "social sciences," and parapsychology cannot.

Naturally, at this point, there will be howls of indignant wrath from some psychologists, social scientists, and parapsychologists, but I hope they will restrain themselves at least long enough to read the rest of what I'm going to say. There will also be creationists who pounce on my words and say, "Aha! Then you admit evolution is not science, since no one can predict what's going

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to evolve and then show it happening in the laboratory." Interestingly, these same people seldom mention that if that argument were valid, a very similar one could discredit much of astronomy, since that field has similar difficulties of verification. Stellar evolution now seems to be one of the more thoroughly understood branches of science, even though no one has ever watched more than a tiny instant in the history of even one star; and no one is likely to, especially in a lab environment, in the foreseeable future. Our considerable (though not absolute) confidence is justified by evidence which is indirect, but abundant, interlinked, and therefore strong. Principles which *have* been tested in the laboratory can be used to predict what kinds of stars should exist, and the fact that the observed distribution of actual stars closely matches the predictions suggests that the theoretical model is essentially sound. Such inferential evidence is essential to chemistry and nuclear physics, too, but the fact that no one has directly *seen* a neutron decay into a proton, electron, and antineutrino in no way invalidates the evidence that it happens.

So, by the definitions I am using here, physics and chemistry and astronomy and biology are pretty clearly "sciences," while the status of the "soft sciences" is, at best, questionable. Biological and stellar evolution represent particular areas in which predictions have not been tested as fully or directly as one might wish, but they're based on principles which have withstood many other tests. Economics and sociology can point to few areas where they have made *any* verifiable predictions.

But does this say anything about the *subject matter* of those fields, or merely about the *disciplines* so far applied to studying them? If you agree that economics is not a science, does that mean that the circulation of currency and goods does not lend itself to scientific study, or simply that economists haven't yet learned to do it? If it's true that economists have not succeeded in making a predictive science of economics, it remains conceivable—*but not proved*—that it actually can't be done. It also remains conceivable that it *can*, and you won't really know until enough sufficiently capable people have tried.

A better question than "What is a science?" might be "*When* is a science?" At what point in its development can a field of study be considered a science? Answer: When its students have learned to *predict*, correctly, consistently, and verifiably.

This may seem like a pedantically trivial observation, but its implications are of far-reaching practical importance. People tend to blur the distinction between subject and discipline, and regard not only the present practice but even the subject matter of a "potential science" as somehow less respectable than those of a "real" science. And differences in respect trigger differences in how people *act* toward different fields.

Now that we have several thriving "exact" sciences, it's easy to forget that every one of them was once as inexact as the "soft" sciences are now. Astronomy started out as astrology; it produced a lot of wild conjecture with very

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little factual basis or predictive ability. Chemistry had roots in a dead-end search for transmutation (which, by the way, finally *was* achieved, but only in this century and by methods the early alchemists could hardly have dreamed of). $F = ma$, the very cornerstone of what we now know as physics and mechanical engineering, was formulated only a few centuries ago, and at that time was a breakthrough of a magnitude which few of today's freshmen are capable of grasping.

Forgetting this history may profoundly affect our future progress—or lack of it—in such fields as social sciences and parapsychology. If a look at history shows that today's "hard" sciences were once a lot softer, it at least suggests that today's "soft" sciences are really just young and undeveloped. Given the right kind of attention, they might eventually be transformed into full-fledged, predictive, genuinely useful *sciences*.

But who's going to do it?

Doing good science tends to require an odd combination of rather uncommon abilities. A firm grasp of logic, and the ability to trust it even when it leads where emotion is reluctant to follow . . . the ability to make imaginative leaps to new hypotheses when old ones fail, *and* to examine the implications of those hypotheses objectively in the light of observational evidence . . . the ability to understand and use the tools of mathematics to manipulate concepts which cannot be clearly or precisely formulated in ordinary language. . . .

In my experience, people who have those abilities show a strong statistical tendency to go into the established

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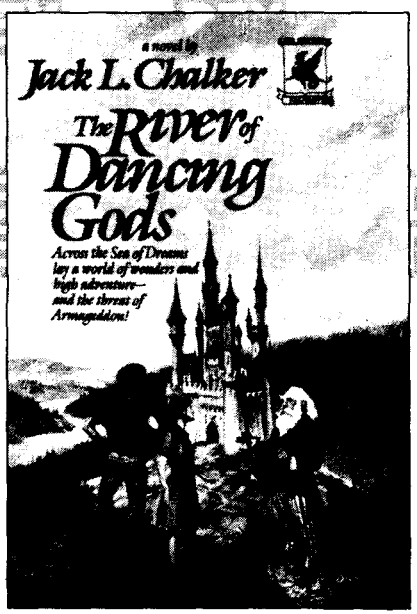
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"hard sciences" or the engineering fields derived from them. This is *not* to say that there are no good scientists in psychology or economics—but they're scarcer than they should be to produce the breakthroughs those fields need. A psychologist whom I respect once told me that most psychology majors he knew were people who started out in something like physics or chemistry and couldn't make the grade. If that's true, we must also expect a "feedthrough" effect, for many psychologists will receive much of their professional training from people with that type of background. This does not bode well for high scientific standards in either the training or the practice of psychologists.

How can aspiring sciences like psychology and economics become "real" sciences if they are populated largely by professionals who couldn't handle more rigorous sciences—and if the people who *could* make them more rigorous look down on them and avoid working in them?

I can't guarantee that all these fields will ever become full-fledged predictive sciences, but it hasn't been proved that they can't. I suspect that at least some of them have "talent." When I say that an individual has talent for writing or music or science, I don't necessarily mean that he now does any of those things well. Talent is the raw material from which competence can be made. The first efforts at fiction by some of the best writers I know showed perfectly appalling technique; my job as an editor was to see through that and recognize what John Campbell called "a writer who hasn't learned to write." When I look at fields like psychology and economics, I think I recognize the raw material from which science can be made.

But for that to happen, they will need to attract many more first-rate scientific minds. They will need people who *could* make it in chemistry or astronomy or electrical engineering, but who choose instead to get their hands dirty doing the groundwork in fields which are not yet highly developed. ■

● The objection that they are not crazy enough applies to all the attempts which have so far been launched at a radically new theory of elementary particles. It applies especially to the crackpots. Most of the papers which are submitted to *The Physical Review* are rejected, not because it is impossible to understand them, but because it is possible. Those which are impossible to understand are usually published.

Freeman Dyson

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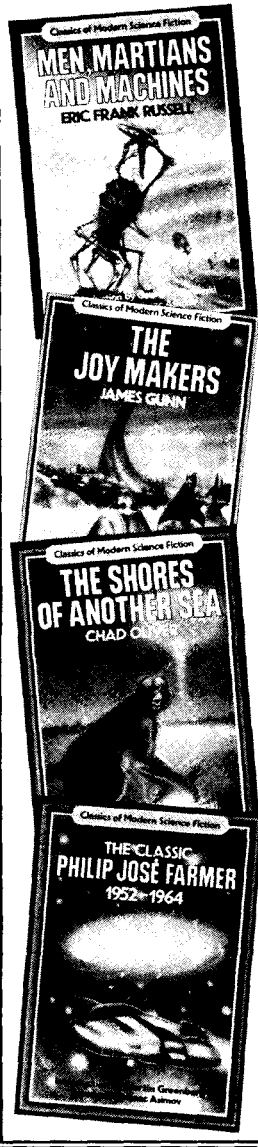

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But that, of course, is another story.

As is the one in which man made the first contact with another intelligent race, the Phuili, who had been drawn to the Shouter from their empire of worlds four hundred lights farther on toward the Hub. When *Far Seeker II* arrived off the Shouter during August of 2416 A.D., the Phuili had already been on that remarkable world for so long they considered it their private reserve.

Cooperative ventures are tricky when the collaborators do everything very differently—and that's no less true of research than of anything else.

THE EXPEDITOR

J. Brian Clarke

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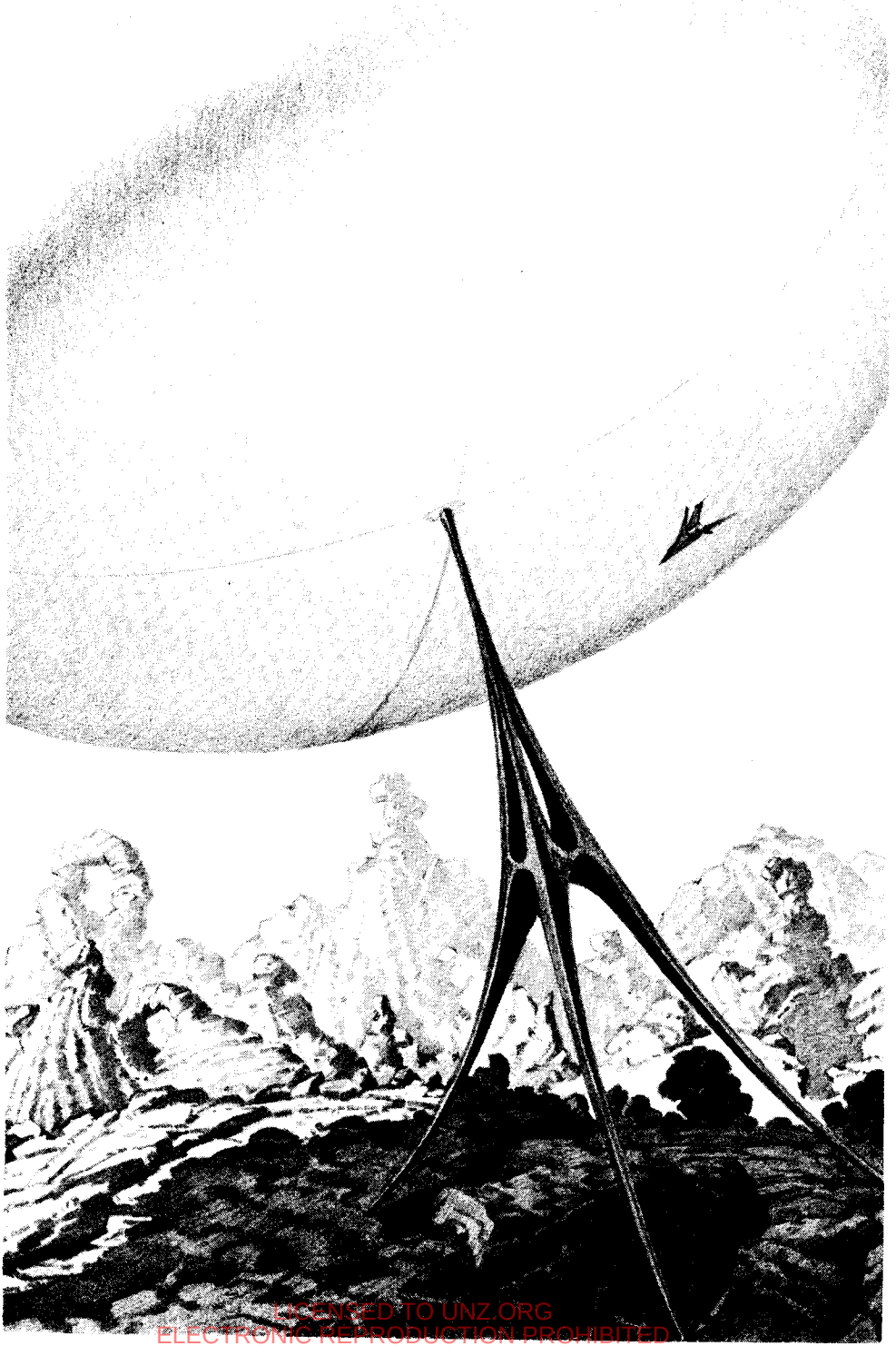

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But because intelligence is apparently such a rare phenomenon in the galaxy, they permitted the establishment of a permanent Earth research unit (PERU) so they in turn could research humans—which they did with aggravating persistence.

Still, that seemed a small price for the privilege of being stationed for a while on this galactic mystery. So I was like a small boy being introduced to his first two-wheeled bicycle as I emerged from the shuttle and confronted the awsome structure towering from the plain a few kilometers away.

"Iss large, iss not?"

Imagine a dog given vocal chords and a flexible jaw: such is the speech of a Phuili. The being was in the driver's seat of a small runabout parked next to the ramp, his wide-eyed canine head regarding me solemnly through the elongated bubble which was his helmet. I had not immediately noticed him, because even one's first alien becomes upstaged against the incomprehensibility on the plain. Awed and embarrassed at the same time I started to stammer an apology, but was halted by the sight of a fanged grin. "When I come," the voice rasped in my helmet phones, "I too could only see zat." A stubby arm gestured. "But now I take you to your kind. Pleese to sit on here."

"On here" presuming the seat next to him, I gingerly climbed aboard and hung on as the vehicle accelerated with a jerk. My small driver swung the steering bar hard over and we turned like a top, bouncing through our own dust cloud and then down the graveled road at a speed which would have made me nervous on a paved highway.

The Shouter has a thin atmosphere, mostly nitrogen with barely detectable traces of oxygen and a few of the noble gases. So the sky was a magnificent velvet blue, paling off at the horizon where the other component of the atmosphere—dust—was lofted by vagrant winds over the bone-dry landscape. I suppose some part of me appreciated the austere beauty of the planet, but my mind was still on the colossus behind us. I would have liked to look longer at it, but it was behind me and in any case my helmet was not as swivelable as my head. So instead I watched the Shouter's only metropolis race toward us.

My driver pointed at a rectangular structure set apart from the Phuili domes and pyramids. "Humans zere," he announced as the runabout shuddered over a series of ruts and I tasted blood where I bit my tongue. I wished I knew the polite way to get the Phuili to stop so I could save myself a few bruises and walk the rest of the way. But not desiring to offend unknown sensibilities, I held my peace and continued to hold on for dear life.

We whizzed by a graceful pyramid. "Phuili on here five ten hands of years," my driver said. "We always stay."

I had been warned to expect this bit of propaganda, so despite my aches and pains I was aware enough not to be surprised. With two fingers and two opposed thumbs, the Phuili numerical system is based on eight. 'Five ten hands' is therefore four hundred, which even considering their shorter year is a pretty long time. In other words, the Shouter is Phuili's by longstanding right

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of possession, and every Phuili had apparently been instructed to make sure humans were frequently reminded of the fact. The 'we always stay' bit was optional but used often, so I suspect our innocent human intentions with regard to the Shouter were not entirely accepted by this likable but sometimes irascible species.

We stopped with a teeth-rattling jerk inside the main air lock of the rectangular building, which on closer approach had become a modest four-story structure. The outer doors closed and air whistled in with a rush, blowing dust from the frame of the runabout. The whistling stopped, and as the dust began to settle a tall human entered the lock from the interior of the building. He was trim and white-haired. "Mr. Digonness?"

I flipped my helmet back on my shoulders and climbed stiffly from the runabout. " 'Digger,' please," I replied as I accepted his handshake. He was even taller than I thought, a good half head more than my own not inconsiderable one hundred eighty seven centimeters.

His mouth twitched into a smile. "All right, Digger, you may call me Clarence. Short for Clarence Van Standmeer, Assistant Research Administrator on this noisy sphere."

I swallowed. Familiarity with the boss is not normally my style. "Yes sir . . . er . . . Clarence."

The smile expanded into a laugh. "We're strictly informal here, believe me." Seriously, "Though we do expect you to perform, of course." He turned to my Phuili driver. "Bertram, how are you? Haven't seen you around lately."

The Phuili had removed his own helmet, proving the similarity between his native atmosphere and ours. His head, though canine, was pink and hairless. The eyes were remarkable: large, dark, and intelligent. "I am well, Clawence my fwiend. I had temporwawy function in administwation until awival of new human. Now I assigned zis one."

The A.R.A. nodded. "I am pleased. I know by experience he could not have a better guide and companion."

"Zat is twue," the Phuili agreed modestly. Before he replaced his helmet, he turned to me. "I and you meet soon."

I hoped my embarrassment did not show. Not only had I been mouthy with the boss, it seemed I had been aloofly uncommunicative with my future partner. "I am looking forward to it," I said, hoping my shyness toward this small alien had not been interpreted as prejudice.

Clarence touched my arm. "Let's go." I hurried after him into the building. The door closed behind us and I heard the thrumming of compressors as they evacuated the lock. "First your quarters," my guide said, leading me up a narrow stairway to the second floor. The room he showed me was small but comfortable, with a folding bunk, a couple of chairs, and a standard screen-terminal recessed next to a compact food prep unit. "Your things won't be delivered for a while," he told me as I discarded my gear and wriggled out of the P-suit. "So I suggest we trot up to the lounge and see who is there. Old faces always like to meet new ones."

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"And vice versa," I said as we walked along the narrow door-lined corridor. "About Bertram . . ."

Clarence stopped and looked at me. One elegant eyebrow was raised, giving him a saturnine expression. "What about Bertram?"

"How does a Phuili get a name like that?"

He frowned. "Their own names are a mess of clicks and consonants, absolutely unpronounceable by humans. So those we know have accepted the nearest human equivalent. They don't seem to mind; in fact I suspect they are quite flattered. Weren't you briefed about that?"

I shook my head. "No."

"I see." Clarence seemed irritated. "You *were* briefed, I suppose?"

"Of course." I added lamely, "It's just that I did not expect to meet my Phuili partner so soon."

The irritation faded, was replaced with a thoughtfulness. "I would have met you myself, except I was informed someone else had volunteered. If I had known it was Bertram . . ."

"Something unusual about that?"

"Digger, you are the first human arrival to be met at the pad by a Phuili. Frankly, I am not sure if you should be flattered. Or apprehensive."

I felt a sinking feeling. "What do I do?"

He looked at me soberly. "Just be careful. And when I know more, I'll advise more."

I sensed the source of his concern. If I, for some unknown reason, was special to the Phuili, then it followed I had become equally special to the Shouter's human community. It was as if a new and untried staff member of an overseas embassy had immediately been promoted—by choice of the host country—to something approaching the rank of ambassador. The diplomatic hazards were obvious. It would also be extremely unnerving to the junior, being way beyond the scope of his expected responsibilities. Which was exactly how I felt as I followed the A.R.A. to a spiral stairway which wound up the central well of the building. As we climbed I tried hard to convince myself I was overreacting.

To a certain extent I succeeded. When I was ushered into the Observation Lounge and again saw the monster on the plain, my burden—imagined or otherwise—seemed not so important. There were people in the room, but at that moment they did not seem so important either. Instead I walked over to the huge window and stared, fascinated. For a while I was permitted my reverie. They had been there and understood. Finally one of them came and stood at my side. "Gets to you, doesn't it?" The voice was low, husky, and pleasantly female.

That's an understatement, I thought, momentarily oblivious to the charm of those dulcet tones. Imagine a shallow, two-kilometer-wide saucer balanced horizontally atop a slender pylon three kilometers high. Add a flickering sphere of pale flame a further kilometer above that incredible assembly, and there you have it. A reasonable description of a reality which in essence is undescribable. Alien Artifact Number One.

More time passed. To me it was not long, but to the others it must have seemed I was stuck in a time warp. A slender hand moved up and down in

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front of my eyes. "You must come down now," the pleasant voice said, "before you grow moss."

I shook myself back to reality. "Sorry," I apologized, turning to the owner of the hand. She was small and nicely formed, with dark hair and intense green eyes. I am shy with women and somehow this one squared the trait. So I stammered like a fool. "H—how long?"

She grinned. "Two minutes. Three minutes. Does it matter? Nothing wrong with being a romantic, Mr. Digonness."

"My first name is Peter," I said, surprising myself.

"It is?" Though her lips curved into a frown, somehow her eyes continued smiling. "Clarence just told us you prefer Digger."

"To you, Peter," I persisted, wondering why. Only my mother called me Peter, and this vivacious beauty was certainly not my mother.

"O.K., you may call me Jenny. Short for Genevieve Hagan. And these are Helda, Jock, Dewinton—who will be insulted if you don't call him Dewy—Allan, and Rhiddian. Clarence, our dear lord and master, you have met. Anyway, everyone will later tell you their last names and what they do here—if they can remember either. But now you are the new boy and are allowed three questions. Number one?"

Instant immersion. I knew then she was the base psychologist—not in the formal sense perhaps—but the one who by inclination and personality usually assumes the role. It seems to happen wherever there is an isolated group of humans, though in this case I was already biased enough to be certain Jenny was better than most. I felt a twinge of disappointment in the realization her interest in me was kind rather than romantic. Nevertheless I accepted her invitation.

"How many of them are there?" I asked, gesturing at the object on the plain.

"The AAs? Nineteen thousand, six hundred and fifty four. But you know that, surely?"

I shrugged. "I thought I did. But after seeing that *one*. . . ." I gestured helplessly.

The girl pointed toward a range of low hills humped on the horizon. Something flickered between two of them.

"Another?" I asked.

She nodded. "About sixty klicks from here. Actually, that and AA One are the only two within five hundred klicks. Planetary distribution is quite random."

"I know where there are three so close together you can visit 'em all on foot within hours," the one called Jock said. He was stocky with red hair and freckles, so typical a type I immediately tagged him as an ethnic Scot with haggis in his veins. But my theory fell apart when he stuck out his hand and introduced himself. "Jean DeLaforte, geologist and com tech. Otherwise known as Jock, which is terribly degrading for one with my sensitive Gallic temperament."

"It's no worse than Digger," I sympathized as I accepted his limp handshake. "You're from Garson's Planet, aren't you?"

He withdrew his hand like one who had been stung. "Who told you that?"

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I grinned. "An angel."

His face cleared. "Well I'm damned. So you know about Garson's angels, huh?"

"They're raising a colony on Luna. Something to do with 'social interactions between species.' A bit more intelligent than chimps, a lot more affectionate than puppies, and about as frail as one-meter butterflies." I pointed at his hand. "I don't wonder you have to watch your strength. Where you come from, it must be damned difficult to avoid hurting the natives."

Jock nodded. "Unfortunately, we don't always succeed," he said sadly.

"Well no one around here need worry about hurting the Phuili," Helda said, brusquely halting the conversation's downturn. A big woman, she had a tough but good-natured face. "Not only are the little buggers made out of concrete, they don't like to hug or shake hands." She chuckled. "Which is probably good for *our* state of health. Right?"

"As far as I am concerned, the only thing about the Phuili is that they are a frigging nuisance," the small man called Dewy grumbled. "They're always there, like an itch you can't scratch. One of these days I might just sneak out on my own and . . ."

"I do not advise it," Clarence interrupted coldly. His voice knife-edged, he continued, "You know the conditions of our agreement with the Phuili,and as your A.R.A. I expect you to abide by it. You are members of PERU, and as such you are each assigned a Phuili partner to facilitate your work here. In return, you accept the fact you are *his* project, and learn to put up with his frequent presence and always nagging questions. As you investigate the Shouter, your partner investigates you. It's that simple." The A.R.A. paused, somehow catching my eye. "None of us likes it, but we learn to live with it. Because we damn well have to!"

Though he was not addressing me directly, I sensed he was reminding me of the peculiar circumstances of my arrival. But already I was beginning to doubt its significance. There is a first

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time for everything, and in that light I failed to find anything remarkable in the fact I had been met at the pad by a Phuili rather than by one of my own kind. If the aliens desired human company—for whatever reason—it seemed logical they would want to commence the aquaintanceship as soon as possible. Even at shuttle disembarkation.

Jenny said, "Clarence, while we are on the subject of Phuili partners, what about Dig . . . er, Peter's? Has one been assigned?"

"Oh indeed," the A.R.A. replied drily.

"I have already met him," I told her.

"You have?"

"He was waiting for me at the pad. His name is Bertram."

"Bertram? *He* met you?"

"Quite a precedent," Helda said thoughtfully.

Clarence smiled a thin smile. "Quite."

I was embarrassed. Everyone was looking at me as if I had shed my skin and become something else. "I don't know why you're making such a fuss," I said uncomfortably. "So I was met by a Phuili . . ."

"*The* Phuili," Jenny interrupted firmly. "Dear man, don't you know? Bertram is Clarence's opposite number here. The Phuili boss."

My first trip was obvious. I knew where I wanted to go and it was expected. Not only by my fellow humans but also by Bertram, as I discovered when I contacted him after breakfast the next morning. His image on the screen nodded politely when I made the request. "Ah, Mister Digonness who I to call Digger. You wish to go AA One. I be at your lock in fwaction of hour."

When a Phuili makes a promise he keeps it. (For that matter, so did everyone of PERU. Being a minority had made Earth's representatives on the Shouter somewhat sensitive about the less laudible aspects of human nature, so for Phuili consumption we did our best to act like saints. Though Moses could not have imagined a less likely setting for adherence to the Commandments, by and large I think he would have approved.) Anyway, it was only twenty minutes later when my Phuili partner rocked his runabout to a halt outside the lock and I climbed aboard.

"No," Bertram said, stepping down from the vehicle. With a sudden and completely startling demonstration of the power contained within his compact body, he leaped clean over the runabout and landed lightly on my side. Though the leap had lofted him at least three times his own height, he was not breathing any differently than normal as he told me, "You dwive. Iss pwoper you learn."

"Er . . . yes." Wondering what other surprises this small being had in store for me, I obediently slid over and wedged myself behind the controls. Somehow I found the lever which moved the seat back, so at least my knees were not at the level of my shoulders. Then I found the speed control, which worked by pushing the steering bar forward. There was no reverse, I soon discovered. If there was not enough room for the vehicle to switch ends in its normal top-like fashion, the procedure was to push it back by hand until there was. It seemed primitive, but the runabout

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was so light I think I could have lifted the whole thing with one hand. Bertram could probably have swung it over his head. Traction for this ultralight machine involved intensification of attraction between chassis and ground, a wondrously useful item of Phuili technology which made me marvel. But which at the same time added another load to my already sagging ego.

I had, in other words, become somewhat depressed. Physical plus technical superiority equals mental superiority, a simplistic equation which at that confused moment seemed entirely logical. If Bertram had been a three-meter humanoid with piercing eyes and a noble brow, and not a half-human sized caricature of a bull terrier in a silver suit, I suspect I would not have been bothered by my newly discovered inferiority. But I do know I would have been in a much worse state if I had not been otherwise occupied driving the runabout and answering my partner's endless questions.

It was tough at first. As AA One rose before us, irritation increasingly supplanted depression. My attention wandered between driving, the enigma ahead, and Bertram's inquisitiveness. He wanted to know about my home in New Mexico, my education, my politics, even about my sex life—though he soon lost interest in the latter when he learned I was middle-of-the-road-normal. But it was when he asked me about my scientific specialty that the conversation suddenly began to get interesting.

"I do not have one," I told him.

A heavy paw pressed down on my arm. "Please make stop."

We jolted to a standstill amid a swirling cloud of brown dust. Ahead, AA

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One was unbelievable, a surrealistic fantasy. Above its enormous dish the flickering sphere of light was an etherial sun, at this distance close enough to cast faint but blurry shadows.

My alien guide turned to me, his snouted head enigmatic behind the reflected highlights of his helmet. "Zen what iss expediter?"

There was no blinding flash of realization. But at that moment I got the first hint of the reason behind Bertram's interest in me. I chose my answer carefully. "Do you know what a catalyst is?"

The head shook slightly. "The word iss . . . not familiar."

"A catalyst is a substance which increases the rate of a chemical or nuclear reaction, but which itself remains unchanged."

There was a silence. Then an explosive, complex cluster of sounds which neither my tongue or voice writer could ever hope to reproduce. Bertram continued, ". . . iss happen in stars wiz carbon. What you call 'Phoenix.' "

"That's it!" I said, surprised. "Hydrogen into helium plus energy, with carbon as the catalyst. Hence the analog. My job here is to act as a human catalyst; in effect 'expediting' reactions between those of the various scientific disciplines. Do you understand?"

The silence this time was a long one, enough for me to rationalize some of my own thoughts. I knew applications for PERU were routinely submitted to the Phuili for final clearance, which explained Bertram's knowledge that I was an expediter. But whether or not my explanation bore any similarity to what he had already been told, I had no way of knowing. What was clear was that I was the first of my kind on the Shouter. It also further explained Bertram's interest, and with that realization my spirits began to recover from their previous low. In this matter at least it seemed I had the advantage, and I felt myself warming toward the little alien. Within the alchemy of my reasoning, Bertram was becoming more 'human.'

"How do human become . . . expediter?"

"In my case, via my former profession of science writer," I replied. Sensing his puzzlement, I continued, "It was my job to use the media to explain scientific matters to non-scientists, to simplify—"

"No," Bertram said.

Cut off in mid-sentence, I could only stare at him.

"Entities who not scientists not wequired to know science. Zerefore you not speak twue. Also you say you not have specialty. Zen perhaps you not scientist like ozers. So why you on Shouter?"

It seemed I had committed a *faux pas*. I stared at my companion nonplussed, wondering how to restore what I had hoped was a developing relationship. "Not scientist" had been grated with the kind of contempt which could only come from one who considered himself a member of an aristocratic elite, an elite which by practice and custom held itself aloof from plebian involvement. If I was right, it was a devastating revelation. But at that moment my only concern was to seek the right words to get me out of trouble. One thing was certain: I would not apologize. Aside from my pride, I had the gut feeling that eating

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humble pie would only make matters worse. So I decided to concentrate on science and scientists. My own connection.

I took a deep breath of canned air. "I know a lot of science. But instead of being concentrated on one discipline, the knowledge I have is spread over many. That is what makes me useful, because I am equipped to explain biology to a physicist, chemistry to an astronomer, and so on. After all, we are here to study a planet, and planetology is a composite of *all* the sciences. So with my help, each member of our team can better understand what his colleagues in the other disciplines are doing. Overall, it increases our efficiency."

I felt pretty smug as I mentioned efficiency. I was sure it was one argument which would appeal to the notoriously logical mind of a Phuili. But I was disappointed. Instead of pursuing the subject, Bertram pointed toward AA One. "We continue now."

So we rolled again, approaching up to and under the towering artifact. Bertram was uncharacteristically silent, allowing my senses to soar up the sunlit side of the AA's pylon, to the half-illuminated bowl suspended between ground and stars. I vaguely remember stopping near the pylon and stepping out of the runabout, all the time gawking like a star-struck tourist. Sixty-eight meters across its base, it rose up out of the rocky ground, tapering up . . . and up . . .

It was an awsome experience. Above me, the bowl was a mass which seemed to block out half the sky; its whole enormous weight held aloft by a column so incredibly frail that for a moment I felt an insane urge to run for my life—before the whole assembly gave way, crushing me like an ant below a falling mountain.

Swallowing my nervousness, I uneasily approached the base of the pylon. It was further than I thought, requiring

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several dozen paces before I got within touching distance. To the eye it was a smooth and lustrous gray, while to the touch there was almost a tacky feel—a definite resistance as I trailed my gloved fingertips across the surface. Then I noticed faint marks irregularly distributed around the pylon's base. Above about the three-meter level, the great shaft rose unblemished.

"Done by Phuili," Bertram said. He had followed me to the pylon and was watching with interest. He pointed at the marks. "Phuili tools made zose. Not useful." He moved further along and indicated a patch of discoloration. "Laser. Still not useful."

I marveled as I examined the discoloration. A material which could resist a laser's solar intensity was something worth knowing about. "Were you able to analyze the material?"

"Iron," Bertram replied. "Carbon. Ozer elements we not identify."

"But that's a steel alloy! How—?"

"Not know. Not molecular bond we know. Matewial feel funny. Act funny. Perhaps PERU find answer."

So a Phuili could be sarcastic, a sour reminder that we humans could hardly be expected to acomplish what the Phuili had failed to do after centuries of effort. I decided to ignore the thinly disguised goad. "I am sure my people are trying," I said carefully.

Again an offering of Phuili propaganda. "Beacons here much before Phuili come. Beacons here when Phuili go, zough Phuili not leave for long time. We permit humans to study beacons because Phuili want know more about humans. At end, we know more about humans zan humans know about Beacons."

An angry response trembled on my lips but remained unvoiced. Despite my companion's needling and assumption of Phuili superiority, I still found myself liking him. So I restrained myself as much for personal reasons as diplomatic. I also decided not much could be gained by staying at AA One this trip, though if I had surrendered to my druthers I could have remained for hours. But I wanted to return to PERU and find Clarence. A wild idea had surfaced in my mind and I needed the A.R.A.'s reaction.

"Interesting," he said.

We were within his office on the main floor. It was comfortably furnished with soft pastel wall hangings and furniture of subtle shades and shapes. The room reeked of restraint, betraying a facet of the A.R.A.'s character which made me uneasy.

I said defensively, "You have to admit it fits the facts better than the beacon idea."

"I admit nothing. Yet."

"Look at the word 'beacon.' It implies some kind of cosmic lighthouse, a concept which is absolute nonsense if you consider the billions of stellar beacons nature has already provided. Neither can I accept that the Shouter is a planet-sized billboard, a sort of galactic exercise in P.R. Because if so,

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what is it advertising? And where are the salesmen?''

''Good point,'' Clarence said with an irritating half-smile which further increased my nervousness. My thoughts churned as I looked for the flaw the A.R.A. had presumably spotted in my argument. Then:

''You are good, you know.'' The half-smile broadened into a grin. ''Especially for one so new here.''

I felt like a child, expecting a spanking, who is instead given a candy. While I was sorting out my response, the door opened and I caught an agreeable whiff of perfume. ''Sorry,'' Jenny said. ''Didn't know you were busy.'' She turned to leave.

''Just a moment.'' Clarence pointed to a vacant chair. ''Digger has a theory. I want you to hear it.''

She came in. ''Oh?''

''According to this young man, the Shouter is not a beacon. Moreover, he claims he knows the true purpose of the AAs.''

''Well.'' The girl sat down and crossed her trim legs. ''My curiosity is piqued.''

Both of them looked at me expectantly, causing me to flush with mixed embarrassment and apprehension. But I was neatly backed into a corner, so I decided to come out fighting. ''The people who built the AAs are still here. On the Shouter.''

Hazel eyes widened. ''Here? Peter, you cannot be serious! Except for the Phuili and us humans, there is nothing on this planet which walks, crawls, flies or whatever. The Phuili declared the Shouter sterile long ago, and they should know. They have been here long enough!''

Clarence coughed. ''I think, dear, you did not cover all the possible means of living locomotion.''

I carefully studied my hands. Though I did not think the A.R.A. would deliberately ridicule my theory before the girl, I still wished I could turn back the clock—at least so I could shut my own mouth before I unleashed the malevolent genie which was now haunting me.

''. . . burrowing?'' Jenny was asking. ''Like moles?''

''Or like humans,'' Clarence said. ''Take the Luna complex of Lansberg, for instance. It's a complete underground city.''

She looked doubtful. ''Yes, but . . .''

I thought I had better reassert myself before Clarence took complete control. So far he seemed on my side, though I still had my suspicions. ''Jenny, have you ever been to Lansberg?''

''Often. Why?''

''There is a big structure on the east wall of the crater. Do you know the one I mean?''

She frowned. ''I think so. It's a condenser, isn't it?''

''Exactly. A device to reject heat by radiating it into space. It's needed because heat is the ultimate end product of every kind of activity, from the wriggling of a bacterium to the motion of the universe. So if . . .''

''Entropy,'' Jenny said. ''Time's arrow.''

Fortunately there was no note of condescension in her voice, otherwise I would have shut up like a clam and stayed that way. It was perhaps the most difficult part of my job: to avoid being too basic when dealing with a bunch of scientific primadonnas. So I was grate-

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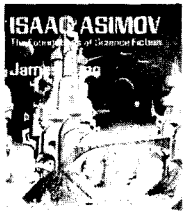

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ful for Jenny's gentle curb on my runaway tongue. Not for that girl, bless her, the look of withering scorn or the sarcastic putdown. So I continued:

"Consider an advanced underground society like Lansberg's, but on a scale so vast its tunnels and galleries house an entire planetary population. Perhaps several populations, if the planet is old enough not to have a fluid core. Now consider the energy that society would require for manufacturing and life support, for creating new living space . . ."

"They'd need condensers. My God, Peter, would they need condensers!" Jenny's eyes were round with excitement. "The Shouter could be like one of those ivory puzzle balls, a whole series of concentric shells layer upon layer . . ." She paused, breathless.

I loved the way she called me Peter. "Of course the AAs are not condensers in the accepted sense," I went on, hoping I was not blushing. "No pipes, for instance, no radiators to condense a vapor back into its liquid state, no circulating system of any kind which is apparent. But there must be others ways to reject surplus energy, using devices our science—even Phuili science—can barely imagine. That is why I am convinced that sphere of light above AA One must be investigated in detail, especially if we can determine how much energy it is putting out. Using that as a base, we can then . . ."

"Just a moment, Digger." The A.R.A. turned to Jenny. "Well? What do you think?"

"I love it!" Eyes sparkling, she jumped to her feet, came over and firmly tucked my arm within hers. "Clarence, give this man a raise. He deserves it!"

He smiled. "Perhaps."

It seemed I had ever reason to feel euphoric. The A.R.A.'s unexpected support and Jenny's bubbling enthusiasm should have been enough to melt the heart of the most ardent pessimist. But something jarred.

Clarence said, "Digger, though Jenny has been with us for only a few months, she has managed to become one of the most respected members of PERU's team. Aside from her obvious charms, she is a talented astrophysicist who has added considerably to what we know about this star system. So don't take her endorsement lightly. O.K.?"

"O.K.," I agreed, which was academic anyway. I would have welcomed Jenny's endorsement if she had been only the cook and not one of PERU's resident geniuses. Still, Clarence's flattering remarks about her seemed out of context, and I wondered what was behind it.

So, apparently, did Jenny. "Clarence, I am not going to thank you for those kind words because I know you too well for that. You have an ulterior motive tucked in there somehwere." She smiled sweetly. "Don't you?"

His answer was as blunt as her challenge. And, to me, devastating. "Digger's theory is not new. The Phuili thought of it two centuries ago, and were so convinced of its merit they squandered most of their resources on the subsequent investigation. All they found was rock and magma. No tunnels. No sub-surface civilization."

"Damn," I muttered.

"Jenny, you chose exactly the right

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moment to come through that door. Telling a man he is wrong is one thing; making him feel foolish is another. Because of your reaction, Digger does not have to feel foolish."

"Balls," Jenny said succinctly. Having relieved herself of that unladylike observation, she dismissed our white-haired boss and turned to me. Hands on hips she was both provocative and formidable. "Peter, there is a bottle of rather good wine in my quarters. For a while, anyway, I think you and I should concentrate on better things. Will you come?"

My heart thumped as I drowned in her unwavering green gaze. Somewhere in the background Clarence had faded to unimportance, a frowning vagueness on the edge of my awareness. Lovely images floated through my mind, erotic images with immediate promise of reality. Finally my tongue unraveled, and with an effort I replied weakly,

"I would love that drink."

The planetary system was old and—quite literally—scorched. Once its family of eleven planets had followed the usual pattern, ranging from an assortment of smaller solid bodies near the sun, through five gas giants (three of which were ringed), and bounded by an ill-defined cometary halo far out on the edge of interstellar space. The fourth planet, a world a little larger and denser than Earth, had once borne oceans, continents, and ice caps. There had been life forms, one of which developed intelligence. Which reached for, and attained, the stars.

When their sun began to show signs of instability, the race made certain preparations. They were by now an ancient people, and as far beyond conventional space travel as a phase ship is beyond the locomotion of a shambling primitive. Many worlds felt their presence during this brief interregnum. But when their preparations were complete, they returned to their own world. From there, they quietly departed this space-time continuum and went—elsewhere.

Slowly the system's sun swelled until it was a red giant whose tenuous surface encompassed the two innermost planets. Then, just as slowly, it began to shrink, finally becoming a dim white dwarf with a miserly energy output which could outlast the universe. Early during this dull near-eternity, a tiny fragment of matter fell inward from what was left of the cometary halo. For centuries it journeyed along a groove dictated by the laws of celestial mechanics, until it fell through the sky of the now-barren fourth planet and entered . . .

"It came down near AA Eight-o-three," Clarence told me over the intercom. "A briefing has been arranged for us in the Phuili Head Sphere, so please get dressed and meet us in the dock A.S.P."

He broke contact before I could comment. Rubbing the sleep from my eyes I groped my way to the bathroom a few doors down from my quarters, then hurried back and clambered into my clothes: I was going to miss breakfast, but I didn't mind. I had had joyous reasons for sleeping late, and in any case the cold shower had shivered me to life. So within minutes I was aboard PERU's pressurized mini-bus as we rolled sedately out of the lock and turned toward

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the Phuili complex. Jenny was two seats ahead of me in the bus, but other than a slight smile as I edged by her, she did not acknowledge our new relationship. Jean DeLaforte leaned across and said something that made Jenny laugh and me a little jealous. So I turned and stared through the window at the approaching cluster of buildings.

Finally we stopped under a large spherical structure, out of which a broad tube descended and locked firmly to the pressure hull of the mini-bus. From his seat at the front, Clarence went to the door and tripped the opening mechanism. Pressures had been equalized, so the door swung easily inward, revealing a flight of small steps rising through the tube. Treading cautiously on the narrow treads, the A.R.A. led us into the Phuili Head Sphere.

We emerged into a low room filled with rows of padded benches. The air was damp, with an odd smell which made me think of burned toast and horses. The eleven of us sat gingerly on the small benches and waited. Jenny had plumped herself beside me, and into my ear she whispered, "Be on your toes, Peter. I think you are going to be part of this."

Startled, I looked at her. But before I could be enlightened, half a dozen Phuili emerged out of an opening at the side of the room. Their powerful little bodies were clad in toga-like garments of various muted colors, their feet in wide-fronted moccasins which made a soft slapping sound as they walked. As they stopped in front of us, one of their number separated and stepped onto a low platform.

"Bertram," Jenny whispered. I nodded. Who else?

"We have wemote see systems at AAs." Bertram's alien voice was harsh in the stillness. "See system at AA Eight-o-zwee saw awival of object and wecorded. Watch."

The room darkened and a concealed projector produced an image of an AA on the sloping front wall. The image rapidly expanded until it seemed the room itself was merged into the Shouter's stark landscape. A few stars were visible in the deep blue of the sky above our heads, and the meanderings of what looked like a dried-up riverbed extended into the foreground and disappeared almost at our feet. Huge boulders littered the flat on which the AA stood, breaking its long shadow into patches of light and dark. Suddenly the image flared with an intolerable brightness, giving way to a madly churning maelstrom of dust and debris out of which house-sized fragments ejected in all directions like gigantic pieces of shrapnel. The dust cloud began to thin, revealing the AA like a colossus dimly seen through a swirling brown fog. And then something jagged appeared and expanded enormously . . .

The image flickered and went dark.

"Jesus," someone muttered as with trembling fingers Jenny groped for my hand. I groped back, at that moment needing the reassurance of human contact as much as she did.

"See system destwoyed," Bertram announced. "Now you watch again."

This time the speed of the action was hundreds of times slower, starting a fraction of a second before something appeared from above the AA and angled

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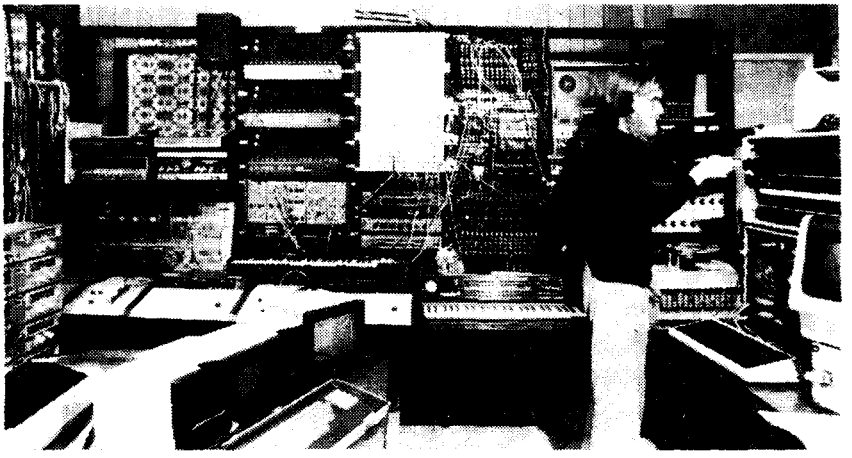

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down to the right of the huge artifact. Still it was almost too swift for the eye to follow, though at the instant of impact we saw the hemisphere of expanding fire caused as the object's kinetic energy was abruptly transformed into heat. Again the image went dark.

I glanced at Jenny. "Boo," she said, her eyes crinkling. A resilient girl, that one.

"Now vewy slow. You pleese watch most close."

The projection this time ran for only a couple of seconds before a gasp of astonishment came from every human throat. "It came out of the light," Dewy whispered. "How . . ."

"Again," Bertram said.

In real time the event had lasted bare nano-seconds. But again we watched it at a rate perceivable to our human senses, and again we were stunned by its impossibility. The AA and its ball of radiance were contained well within the limits of the projection, so there was no doubt where the rocky missile originated. First it was not there, then suddenly it was—emerging *out* of the light and almost instantly fading behind the shock wave produced as it slammed into the Shouter's atmosphere. Bertram turned off the projection when it was obvious we understood the significance of what we had seen.

"Now humans know what Phuili know. You go back PERU and talk. Zen Clawence and new one weturn here and talk. Goodbye." With a polite jerk of his massive head, Bertram rejoined his companions. The six Phuili then formed into a line and with quaint military precision marched out of the room.

Helda, who was sitting just in front of us, expelled her breath with an explosive, "Well!" Swiveling in her seat, she turned hostile slate blue eyes toward me. "You're the only new one here, Digger. What makes you so bloody special?"

"We will discuss that later," Clarence said sharply before I could respond to the big woman's challenge. He stood up and faced us. "But before we do, I want each of you to spend a quiet, thoughtful couple of hours within the privacy of your own quarters. We will then assemble in Observation at thirteen hundred and jointly try to make some sense out of all of this. Until then, ruminate, cogitate, but *don't* communicate. I want no consensus until you have had time to sort out your individual reactions to what you have just seen. Is that understood?"

Clearly understood. Which was why we were a silent crowd as we rode back to PERU. But as we emerged from the bus, Clarence pulled me aside. "In my office," he said. He nodded at Jenny. "You too."

I don't know what the others (especially Helda) thought as Jenny and I were ushered away to a cozy little conference. I do know Clarence had more than our colleagues' sensibilities on his mind as he closed the door behind us and said unequivocally, "Digger, you have been on the Shouter for only two days."

I said nothing. There was little point responding to the obvious.

He went on, "Yet during that brief time, you have managed to disturb our Phuili hosts quite profoundly."

I looked at him doubtfully. "I don't know why. All I have done is—"

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"—hit them right where it hurts most—in their carefully nurtured egos." The A.R.A. chuckled. "Largely because of you, young man, the Phuili have made the astonishing discovery that we humans are something more than primitives with a technological bent."

"I did that?"

"In absolute innocence," Jenny said soothingly. "Peter, you are the living proof of the value of an untrammeled mind."

"She's right, you know." Clasping his hands atop his indecently tidy desk, Clarence studied me closely. He had the worried air of one who has been forced into a premature decision; hoping he is correct, risking serious consequences if he is not.

His jaw firmed. "PERU's central problem has always been the Phuili attitude to humans. To them we are no more than a race of monkeys who know how to build steamboats but still live in trees. As scientists, they find us quite fascinating. As individuals, most Phuili are rather fond of us in a sort of condescending way. Beyond that . . . even suggesting a human may be something more than a primitive who happens to have a knack for technology would be equivalent to Copernicus declaring the Earth is not the center of the universe. It just is not done."

"But that's exactly what Copernicus did do," I said, puzzled.

"True."

"He had some pretty strong evidence, though."

"Also true."

I took a deep breath. "Correct me if I am wrong, but are you telling me that with the right kind of evidence the Phuili will accept us as equals? Evidence such as . . ." I swallowed, ". . . a smart monkey?"

Jenny pealed with laughter. The A.R.A. managed not to smile, though I suspect that it required considerable effort.

I was more embarrassed than amused. "Clarence, when the Phuili came up with the idea the AAs could be the visible indication of an advanced subsurface civilization, how long had they been on the Shouter?"

He smiled at the apparent change of subject. "About a couple of centuries. Which is quite a long time, considering it took you only a few hours to come up with the same notion. Don't you think so?"

I said irritably, "I would rather not comment, if you don't mind." I knew I was being stuffy, but at that moment I had the feeling I had been manipulated and it annoyed me. Still with the chip on my shoulder, I went on, "In any case, what has all this rigmarole to do with what happened at Eight-o-three?"

"Later," Clarence said. "When we meet with the others. Right now, Mr. Peter Digonness is the prime subject of this discussion."

I shifted uneasily in my chair. Jenny was watching me anxiously, and I tried not to meet her gaze. The being manipulated part was bad enough, but if Jenny herself was involved . . .

It was a treacherous thought, one I tried to ignore. Unfortunately thoughts are immune to dismissal, especially those born out of a bruised ego. For my own peace of mind I knew I should challenge Jenny: present my doubts and ac-

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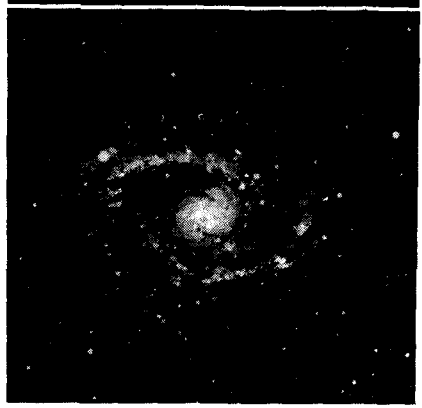

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cept the consequences. But it was not the time or the place. Other questions still needed answers.

"You were in a sense primed for this," Clarence said, beginning to answer the unspoken questions. "First by your background, and then by the fact that we deliberately withheld from you certain events concerning the history of Phuili activities on this world. The rest was mostly up to you." Leaning back in his chair, he beamed at me. "Believe me, my boy, what started as a long shot has ended up as a near-miracle. It turns out you were the ideal catalyst."

No thanks to you, I wanted to say. Instead I turned to Jenny. "Did you know about this?"

"Some," she admitted cautiously.

"Tell me."

"I'd rather Clarence . . ."

"Not Clarence. You."

She looked at me doubtfully. "All right." She turned her face away from mine. "We had to convince the Phuili—against their own ingrained instincts—that we humans are more than bright morons. Simply telling them so was no good because the Phuili would not believe it. They would not *want* to believe it—any more than we humans would want to believe that a bunch of apes are as smart as we are."

I nodded. "So you set things up hoping your new expediter would come up with an answer it took them centuries to . . ." I stopped. "Dammit, that's no good. The sub-surface civilization idea was strictly mine. I consulted with no one."

"Not since college," Jenny said. She turned and faced me again, her expres-

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sion determined. "*Space, The Perfect Heat Sink*. Don't you remember?"

Dumbfounded, I stared at her. "My third-year thesis," I whispered. "I'd forgotten."

"Consciously, perhaps. But not your subconscious. Put radiators on every mountain-top, you said. Get rid of thermal pollution by projecting it into space. Is it so surprising you interpreted the AAs the way you did?"

"It certainly didn't surprise you," I said bitterly. "Did it?"

She looked hurt, but at that moment I did not care. "And how did you persuade the Phuili I actually did what I did? From what you have told me, it's certain they would not accept any third-party explanation. How was it done, Clarence? Did you have a Phuili eavesdrop from the next room?"

"As a matter of fact, yes," the white-haired man said calmly.

That stopped me. Astonished, I stared at him. "Bertram?"

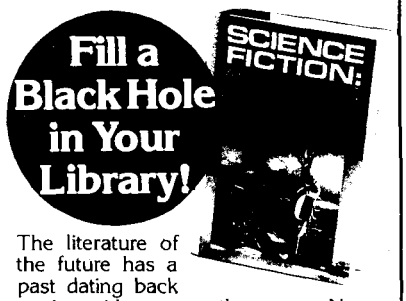
He shrugged. "Who else?"

I should have known. I should also have felt angry, but all I could manage was a spark of irritation. "So it was a set-up. But how did Bertram know I was not part of the deception? Hell, I could have been acting a bigger lie than any of you!"

"Peter, there is something else you don't know about the Phuili," the girl said.

I sighed. "I'm sure there is. I am also sure you are going to tell me. Whether I give a damn or not."

She ignored my sarcasm. "They have a sort of sixth sense. It isn't telepathy exactly, because they can't read conscious thoughts. But what they *can* read



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are emotions—which they do with an accuracy barely this side of uncanny. Pain, joy, guilt, and the rest are like a printed page to them, a communication. So Peter, as you described your theory to Clarence yesterday, Bertram had no difficulty sensing your sincerity."

There was much I could have said at that moment. Even more I wanted to say, especially to Jenny. But the moment passed, and so I think did some of the innocence of my feelings for her. But as reason became a little less clouded by emotion, I began to realize I was ahead in the game. That in fact the pawn was about to become a player.

I made my first move. "Clarence, I want to talk about AA Eight-o-three. *Now.*"

In ways which confounded the scientists of both species, Phuili and humans were remarkably alike. Of course the basic fact that both are humanoid surprised no one. It is nature's way to evolve for efficiency, and there is no denying the basic efficiency of an upright four-limbed design supported by an articulated internal skeleton. But too many similarities went far beyond the odds, such as respiratory systems which breathed almost identical air, eyes which were sensitive to the same wavelengths, and ears which heard the same sounds.

Nevertheless, psychologically and sociologically, man and Phuili were truly alien to each other. Perhaps it was man's total competitiveness and the Phuili's complete lack of it: Earth's fecundity forcing a fierce instinct for survival, the park-like and temperate world of the Phuili in which the driving instinct was curiosity rather than competition.

So while man fought and clawed his way up the evolutionary slope, the Phuili had placidly taken their time, not knowing competition because none existed, driven more by their obsessive desire to know than by any need to dominate competing predators.

By the standards of humankind, the rise of Phuili civilization had consequently proceeded at the rate of the proverbial snail. Though the Phuili equivalent of the industrial revolution had taken place long before human Stone-Age priests erected their monoliths at a place called Stonehenge, the first Phuili spacecraft was not launched until about the same time a human named Copernicus began to shatter the accepted egocentric view of the universe.

The concept of time was not, however, the only gulf separating the understanding of each species for the other. Of even greater significance was an abstraction called pride. . . .

Zero minus sixty seconds.

The probe was a modest affair, merely one of our atmospheric sounders with short wings added for horizontal stability. AA One was about ten klicks away; a giant which, if it had awareness, would probably not even notice the pinprick we were about to administer to its bright head.

Zero minus forty-five seconds.

Irv Dewinton—Dewy—had come up with the idea during our noisy buzz session in PERU's Observation Lounge. "We saw that damn rock appear out of nowhere. Right?" He grinned. "So it'd only be poetic justice to throw one back, even if it is into the wrong AA."

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My own idea, suggested earlier to the A.R.A., had been that we conduct a series of "bombing runs" in which specialized free-fall probes would be dropped into the sphere of light from a slow moving shuttle. But considering our meager resources, and the fact that ground-to-orbit shuttles are not exactly suited for such atmospheric antics, Dewy's more modest proposal made obvious sense. So I swallowed my pride and raised no objections. Neither did Clarence and Jenny, though I sensed the stare of one pair of puzzled green eyes.

Zero minus thirty seconds.

Not everyone from PERU was present for the launching. Despite DeLaforte's protests, Clarence had dispatched the geologist and two assistants to join the Phuili investigation of the new crater at Eight-o-three. Undoubtedly the three would radiate enough displeasure to be detectable by even the least sensitive of the empathetic Phuili, so I assumed it was the A.R.A.'s way of demonstrating to our hosts that human thoughts do not necessarily dictate human actions.

Zero minus fifteen seconds.

On the other hand, only one Phuili was present as we prepared to poke the eye of AA One. And he, I suspected, was more interested in "why" than "what." Bertram himself had given the clue to his attitude when Clarence and I went to him with our proposal. "If you wait until work finish at Eight-o-zwee cwater, zen you can send pwobe into light fwom where wock came. Yet you do expewiment here, where event not happen. Do not understand."

I bet you don't, I thought with an irritation which was becoming the norm for a lot of Phuili pronouncements. Still, their blind logic was a weakness, a crack in their supercilious hides. If only I could convince Clarence . . .

Zero.

With a flash and a roar the probe bounded aloft, tilted into level flight, and sped toward its target. We braced outselves as it neared the light above the enormous artifact, expecting anything and everything—a flare, a burst of energy, a spectacular happening which we hoped would leave us still on our feet. What we did not expect was that the probe would vanish with as little fuss as a rabbit diving down its hole, leaving only the dying thunder of its passing.

We looked wordlessly at each other. Then we looked again at the enigmatic sphere of light. Still nothing. The insistent beeping of a priority signal alarm finally broke the paralysis. "*Eight-o-three calling One. Eight-o-three calling One. Clarence, are you there? Dammit, is* anyone *there?*"

Despite the sputtering and crackling of an unusual amount of electrical interference, the voice on the priority channel was recognizable as DeLaforte's, supposedly at the site of AA Eight-o-three 500 klicks away. So we shared Clarence's immediate assumption of trouble as he answered, "O.K. Jock, I can hear you but not clearly. What's the problem?"

"*Problem? More like a disaster! Clarence, Eight-o-three is falling apart! First the light went out, and now the whole damn structure is turning itself into a pile of rubble!*"

"Are you O.K.? Is anyone hurt?"

"*We three are fine. So are all the Phuili I think, though I can't tell for*

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sure because of the dust. It's already so thick it's like trying to see through a wall. But we can hear the breaking-up noises, and the ground is shaking like a young earthquake. And the lightning! Clarence, how is AA One? Is this local or is the whole planet going?"

"AA One and the Shouter are both fine, Jock," the A.R.A. replied calmly. "However I suggest . . ." His voice trailed into silence as he became aware of the frantic gesticulations I was making from my station at the launch control panel. His attention gained, I then repeatedly pointed at the panel. Finally he nodded as he understood the point of my antics.

"Jock, I don't know how much hard data you have on that . . . ah . . . event, but can you at least pinpoint the exact time the light went out?"

For a few moments there was no answer, just the staccato noises of interference. Then: *"Eight minutes and seventeen seconds past the hour. Is that significant?"*

"My God, is it ever," I muttered, awed. Though all the test data had been recorded, some figures—including time of telemetry termination—were still registered on the digital display. Clarence could not see the figures from where he was, but he heard me over my open channel. So did Jean DeLaforte.

"Who is that? Is that you, Digger?"

Clarence said, "Never mind." I heard him take a deep breath. "Jock, we successfully launched the probe. Its telemetry terminated when it disappeared —literally—into the light above AA One. I'll let you guess the exact time of that termination."

There was an astonished silence. But the verbal response, when it came, was a cool, *"Guess we'd better book the next flight back to PERU."*

Easily said. Not so easily done. Unfortunately there was only one aircraft on the planet, and it was not owned by PERU. Though Bertram came over and had the 08:17 indication explained to him, he remained unmoved. "Wingship weturn fwom Eight-o-zwee when work at cwater finish. Maybe in two, zwee days. No need for sooner."

If a rain forest sprouted overnight from the barren Shouter desert, I suspect Bertram would have taken his time to determine the phenomenon was worthy of investigation. And had he been human I would have called him pig-headed. But he wasn't, so obviously I couldn't. I knew my colleagues shared my sense of helplessness; I could see it in their helmet-shadowed faces. But in the cause of preserving the status quo we somehow controlled our frustration and settled into a rigid calm. Whether or not Bertram was reading this repressed gamut of emotions I could not tell, but in any case I suspected he would accept it as a normal human reaction which mattered little. I briefly wondered if, by pressing Bertram and forcing a second refusal, I could finally trigger the repressed anger of my colleagues. But I had sense enough to realize this was not the time, that the sudden unleashing of a flood of resentment and wounded pride would be a pyrrhic victory at best. The objective was, after all, to persuade the Phuili to accept us as equals, not to provide what Phuili hardliners would gladly accept as further evidence of human irrationality.

". . . O.K." Clarence was saying,

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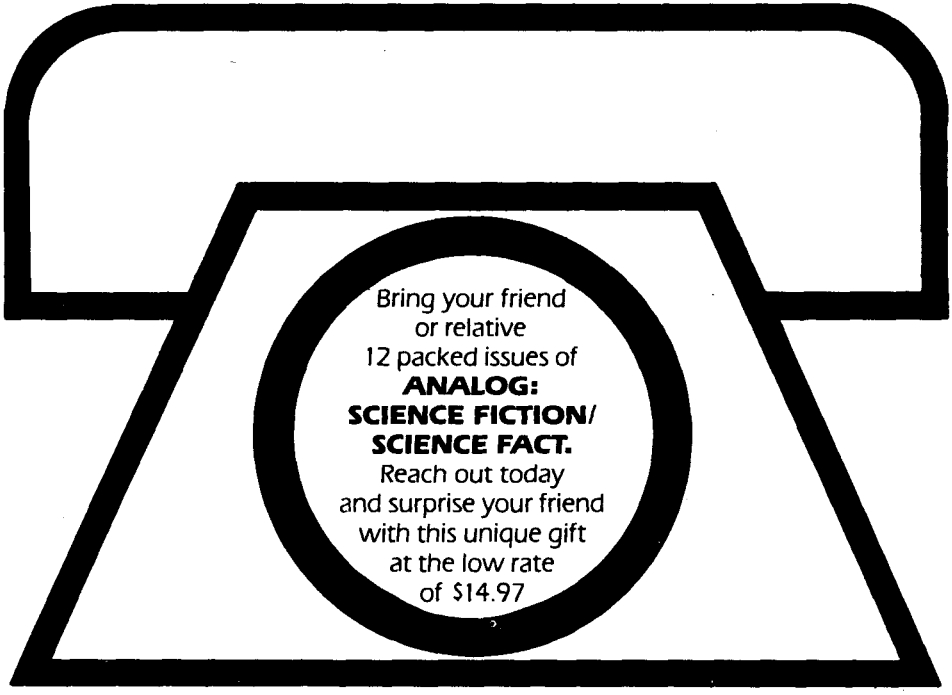

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"concentrate on what is left of Eight-o-three and let the Phuili continue their thing in the crater. Meantime, if you can come up with a rational explanation for all this, then for sanity's sake use the radio and save us a lot of headaches. In any case, I expect you back at PERU within two or zwee days."

The A.R.A.'s deliberate parody of Bertram's speech was so uncharacteristic, only Bertram himself—who lacked the human sense of the incongruous—did not react in some way. Fortunately the small alien did not query the assorted noises of stifled mirth, though I suspect he was not unaware of the lifting of tension which followed Clarence's verbal palliative. Certainly Bertram was not his usual garrulous self as he watched us prepare our equipment for transportation back to PERU. Signaling me to turn off my radio, Jenny came over and touched her helmet to mine. "Have we finally made a dent in that one-thing-at-a-time Phuili logic of his?" she shouted tinnily, gesturing at our friend.

I peered into her face, only inches from mine. "If not us, then what we just did," I shouted back. "From now on, I think we're going to have to be pretty damn careful what we do or say when he's around."

She grasped my arm. "Meaning?"

"Meaning an unpredictable Phuili is a combination I, for one, would rather not have to deal with."

"Oh." Jenny's grip tightened. "Digger, talk to Clarence. Have him call another meeting."

"He probably already has that in mind. Anyway, when he does, there is something else I want to bring up."

She stepped back to look at me. Then she came close again and our helmets bumped. "What do you have in that devious mind of yours?"

I grinned at her. "I want us to build a model airplane."

Everyone's immediate acceptance of my proposal was a flattering surprise. The truth was that Clarence's guarded approval, the support of Jenny and my other colleagues, even Bertram's noncommittal "You do, I watch" made me overlook the idea's real value—that it was cheap and therefore affordable. Even if it failed.

I had been an enthusiastic model builder in my youth. So when Jock and the others finally arrived from Eight-o-three, *Dragonfly* was ready for its test flight. First, however, I was present when Jock reported what the Phuili had found below the crater near the small mountain of rubble which was all that was left of the huge artifact.

". . . pretty well pulverized by the impact of course, but enough was left to indicate some kind of thrust device and guidance system. I understand the Phuili intend to check out the metallurgy, but I doubt they'll have any more success than they did with the material of the AAs."

"Technology from the same source?" Rhiddian Felmann hazarded. He blinked solemnly. "Now wouldn't *that* be some can of worms!"

"More than you realize," the A.R.A. said, rising stiffly to his feet and joining Jock at the front of the room. He looked tired, which was not surprising; his bed had hardly been used for days. "So before we start trying to make two and two equal five, let's look at the facts. To

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start with, all we know for certain is that the dissolution of Eight-o-three was somehow triggered when our probe disappeared above AA One. It is equally certain we do *not* know how or why an apparently guided object appeared out of nowhere at Eight-o-three. Neither do we have any hard evidence connecting that earlier event with the dissolution.

"So please, my friends, keep your hunches to yourselves and demonstrate to your partners you can be as systematic and logical as any Phuili. Already they have learned we humans are more than we seem, and I think they are slowly coming to terms with that fact. But if we push too hard and further challenge their concept of proper order, I am afraid we run the risk of losing everything we have gained . . . and probably more. Sorry, Jock, but for the moment we will have to consider your mission at Eight-o-three as strictly an exercise in P.R. Whatever the Phuili found there must remain a matter for the Phuili only. If and when they want us to become involved, I am sure we will be notified. Officially."

"But we are involved!" Jock protested. "Dammit, we were there!"

"As observers only. As Bertram was at AA One. Mutual diplomatic courtesies, nothing more."

"Horseshit," Irv Dewinton grumbled. "We've as much right as that bunch of—"

"Oh Dewy, shut up," Jenny said crossly, turning in her chair and glaring at the astonished engineer. "For the sake of your stupid rights, would you wreck our chances to learn something about matter transmission?" Suddenly she jumped to her feet and glared at us all. "What is the matter with you people? It's been staring us in the face since that rock appeared out of nothing, and still no one will say it. So I'll say it for you." She took a deep breath. "*Matter transmission!*"

A scientific impossibility, of course. Earth science had declared so long ago, Phuili science centuries before that. But human scientists are not the masters in their house; though they declare, they do not control. In contrast, science on Phuili is a religion, scientists are its hereditary priests, and scientific declarations bear the holy stamp of infallibility. To dispute such declarations is therefore the same as saying the Old Testament prophets were liars. So the awkward silence which followed Jenny's outburst was not so much a condemnation of her daring as it was a symptom of the "don't rock the boat" syndrome which had come to affect our discussions even within the privacy of our own building.

The silence ended as Clarence said quietly, "Thank you for that, Jenny. I am not so sure I agree with you, but we would hardly be true to ourselves if we ignored every . . ." He coughed. ". . . impossibility."

It was typical of him. Though Jenny had seemingly ignored his request to restrain our more radical ideas, his immediate and wry acceptance of the genie's being out of the bottle did a lot to clear the air. There was no need for further discussion; we all knew our restated awareness would not be unnoticed by the empathetic Phuili. So when we went outside for the test flight and were confronted by Bertram and another Phuili inspecting our flimsy contraption, my immediate, gut reaction was

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a nervous *He will sense the lie. So how do we avoid the truth?*

Equally ominous was the Phuili wingship squatting only a few hundred meters from PERU's front door, obviously moved there while we humans were agonizing within. If the motive was a not-so-subtle putdown, it was effective. Compared with their droop-winged monster, our little model was a crude toy.

When Bertram saw me, he pointed at *Dragonfly* and confirmed my worst fears with a single word. "Why?"

Clearly he sensed a deception, so I had to respond in a hurry. I tried to avoid the dilemma by stating the obvious. "We will fly it into AA One. Just as we did with the probe."

"Not same." Bertram stooped beside the tube and wire fuselage and pointed to the small camera I had installed behind the power cell. "Zat is differwent."

I swallowed. "Just a slight variation. Optical imaging is an old trick with us. It may not be scientific, but we find the pictures . . . er . . . pleasing."

Alien eyes studied me reflectively. "What you zink you get pictures of?"

A gloved hand gripped my shoulder. "If we knew," Clarence said, "we would not have installed the camera. It would not be logical."

Bertram's jaws flexed slightly. *A smile?* I wondered. "Your pwobe not weturn. Maybe not zis one also. So how you get pictures?"

The grip on my shoulder tightened. "*Dragonfly* will be programmed to fly along a return course."

"Ah." I braced myself, certain the next question would not permit further evasion. Instead, Bertram confounded us all by gesturing towards AA One. "Light is high. Four kilometers above gwound. Little machine must climb hard." His strange features unreadable inside his elongated helmet, he continued, "So I take on wingship. Digger come wiz me and welease little machine when wingship near light. Better eh?"

I suppose it hit everyone the same way. In my own case, after my stomach recovered from its flip-flop, I weakly thanked my Phuili partner and said something about the need to first run a test.

"No test. Flight now. I take wingship up slow wiz little machine. You welease when you zink pwoper."

At another time the comedy of Bertram's English would have lightened the moment immensely. Instead, the dilemma he was forcing on us was somewhat akin to making us choose between the devil and very deep waters. Desperately I wracked my brain for an excuse which would persuade Bertram to grant time for a "humans only" consultation.

A thought ahead of me, Clarence tried the direct approach. His tone was deferential. "Bertram, may we be permitted a few minutes to discuss this?"

"I wait," the Phuili replied. "You not take long."

So we hurried back into PERU's main lock. As soon as the status panel indicated PRESSURIZATION COMPLETE, Jenny whipped off her helmet and said angrily, "He wants us to fail! Why else won't he allow a test?"

Wearily, Clarence sat on an empty packing crate. "Why indeed," he echoed. He looked at me. "Well, Dig-

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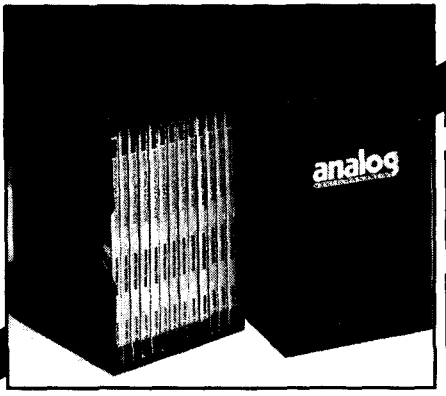

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ger, it's mostly your project. What do you recommend?"

I wished he hadn't asked me. There was no clear answer, and I was sure he knew that as much as I did. "If we insist on a test," I said, "we are admitting the possibility of a failure. But if we don't test and accept Bertram's offer, we will be using an untried machine with an even better chance of failure."

"So what's failure?" It was Helda, looking belligerent as usual. "Nobody likes it, but it's part of what we do, isn't it?"

Clarence sighed. "In the Phuili context, failure is synonymous with the state of being inferior, and according to official dogma a scientist is *never* inferior. Probably because of pressure from his hardliners, Bertram has apparently decided to use the *Dragonfly* project to force the issue of human status on the Shouter. If, as we claim, we are true scientists, then the project will succeed and our cause will be immeasurably advanced. But if *Dragonfly* does something silly like crashing, or disappearing without returning data, then I am afraid we face restrictions which will probably terminate PERU's usefulness."

"Arrogant little bastards," Felmann muttered.

The A.R.A. smiled slightly. "Look at it from their point of view. They have assumed their exclusiveness for so long, it has become an instinct. Suddenly we humans appear on the scene, creating an unsightly crack in their pristine ivory tower. And when we—"

I interrupted. "'Scuse me, Clarence, but wasn't it already cracked? What about that abortive attempt to prove the existence of a subsurface civilization here?

Again the smile. "What about it?"

"It was a failure, wasn't it? How did they handle it?"

"They had two choices. Either to accept immediate demotion to serf status, or to remove their embarrassing presence from the universe. To the Phuili elite, that is of course no choice at all. So they did what they had to do. All ninety of them."

From the sounds of indrawn breath, it was apparent this was the first time anyone had heard the story. "What did they . . . er . . . ?"

"They boarded their ship and dove it into the sun."

I wasn't sure what this had to do with our present situation, though if I dwelled on it I suspected I would come up with some uncomfortable parallels. So I decided to damn the torpedoes and full steam ahead. "Let's take Bertram up on his offer. If he wants to rub our noses in it, let him work for the privilege. What do we have to lose?"

"Well, don't expect *me* to take a dive into the sun," Allan Phu Wong said darkly. The only oriental on the team, he had a sense of humor with a disconcerting bite. "But I agree with Digger. On the slight chance *Dragonfly* pulls a rabbit out of the hat, I want to be around when the Phuili realize they have helped us do exactly what they didn't intend—which is prove that we humans are a damn sight smarter than they like to think we are."

"Amen," Jock said fervently.

"Two amens," Jenny said, with an anxious look in my direction. I wondered about her apparent concern, but

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the chorus of consensus diverted me until Jenny pulled me aside and whispered, "Peter, please be careful. Before we came in here, I saw Bertram hand his Command Disc to his deputy."

"Sorry, but I don't . . ."

"It's the delegation of authority. As Clarence does when he is planning to be away for a few days." Suddenly she clutched my arm. "But not if he's only going for a thirty-minute plane ride!"

So it was to be only a short ride. But perhaps the Phuili hierarchy is so rigid it cannot tolerate being without a top "dog" for even a few minutes. Or so I reasoned as I squatted uncomfortably in the wingship, holding *Dragonfly* as firmly as I could against the buffeting slipstream. As Bertram had promised, the ascent was gentle, but even the most advanced technology could do little about the huge volumes of air rushing into the down-swivelled jets. I looked away from the tiny dots of my friends still watching the bat-winged vehicle bearing us skyward, and turned my attention to the flickering enigma ahead. Already we were slightly above AA One's huge dish, and I marvelled at the absolute and unrelieved blackness of the dish's inside surface. Nothing reflected from it, not even the sphere of radiance so close above its center. Still we climbed, and now the helmeted head of my small pilot was silhouetted against the light.

"How are you doing up there?" came Clarence's voice. *"From where we stand you look pretty close to launch."*

"Vewy soon," Bertram replied. "First we go closer and higher. Zen I dwop wingship so Digger can welease little machine."

"Good luck to us, Digger."

"We need it!" I muttered, inwardly cursing the strange communications system, which allowed only the pilot to transmit. I turned on the bird's power and control systems, felt an increasing tug as the tiny electric turbine whined up to speed. Bertram tilted the wingship over into a shallow dive, and quickly my arms began to ache as *Dragonfly*'s three-meter wings bit into the thin air. The AA's light was enormous, filling half the sky in front of us. Below the dish was an incredible black lake with no shores, the other half of a whole which was closer to nightmare than reality.

Bertram spoke. "Now."

Dragonfly soared away like a free spirit, and as Bertram slowed our descent I saw her begin a graceful turn, the sensor in one wing-tip aiming her at the target like a moth to a flame. The small wings leveled, and accelerating swiftly . . .

NO!

The flash of the laser was an obscenity still fading from my vision as the burned tatters of *Dragonfly* fluttered and dispersed like scraps of garbage thrown into the wind. "No," I repeated, releasing my restraints and clawing my way forward into the seat behind the pilot. If I had been a member of a half-savage species such as the Phuili wanted to believe, then at that moment I would have killed Bertram and taken my chances with the wingship's unfamiliar controls. Instead I was only angry, a cold and rational outrage which demanded an

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answer. I tapped Bertram on the shoulder. "Why?"

For some reason we were rising again, the huge light dropping below the wingship until only its upper edge extended above our visible horizon like a sun peeping over the edge of the world. Bertram did not look back at me as he answered, but even to my inexperienced ears there was a note of strain in the emotionless, alien voice.

"Phuili not like humans to be equal to Phuili. But we accept if humans pwove zey equal. Phuili not accept zat humans better zan Phuili. If little machine go into light and come back, Phuili science bad hurt by beings not Phuili. Not to be accepted. Perhaps to be accepted if Phuili and human do together. . . ."

"*Clarence, are you listening to this?*" I shouted, hoping the sound of my voice was penetrating to the pick-up in Bertram's helmet.

"No talk wiz gwound," Bertram said. "I stop."

I sagged back into the seat. So we were alone in the sky: me, a small alien, and ideas as strange to each of us as we were to each other. I had sensed desperate sincerity in Bertram's disjointed explanation; to my surprise I seemed to be detecting mood easier than meaning. A preposterous idea occurred to me. It was that we were two halves of a whole, different only in the sense that left is different from right, up from down, past from future. Yin and Yang. Different aspects of the same unity.

I was detached, riding on philosophical wings of thought far more real than the alien wings which were carrying me through the Shouter's sky. That we had tilted into a rapid descent, even that the wingship was drawing dangerously close to the light above AA One . . . these were minor matters. Hardly important enough to interrupt this ecstatic totality of feeling. Had it been suggested I was being manipulated, I would have laughed aloud. This was me, my *real self*. Free at last from the stifling restraints of convention.

Much later I learned Bertram had a stun pistol, that he was prepared to use it if I tried to interfere. But I was so divorced from reality, it was only at the last impossible moment I began to realize what was happening. *Phuili and human do together*, Bertram had said. Now, too late, I finally understood.

Around us, the brighteness flared.

I shattered . . .

One wing askew, its forward section crumpled, the wingship lay in a rocky valley between gold-flecked mountains. Enormous spiky-leafed trees, one of which had been our undoing as Bertram fought the windship down through the heavy air, were scattered along the valley and up the surrounding slopes. Atop the crest of a high pass at the head of the valley, an AA towered into the blue-green sky, its crown of light shimmering among piled white-rimmed clouds. Obviously that bright portal was our way home. But without some means to repair the wingship, the Shouter was as much beyond our reach as the small moon in the sky.

I stared moodily at the prone body of my Phuili companion. At first I had thought he was dead, or at least badly injured. But now I was reasonably sure his color and temperature were nor-

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mal—as much as I could tell from my limited knowledge of Phuili physiology—and his double heartbeat was as regular as my own. I had removed both our helmets, and despite the hopelessness of the situation I savored the warm, sweet-smelling air.

Had it been matter transmission? Certainly we were not where we started, and certainly the method of transportation had been more than a little traumatic. The tearing sense of disassociation, followed almost instantly by the terrible *squeeze* of reassembly, were memories I would like to forget. But probably wouldn't.

A thought intruded. *This must be a parallel world. Instead of traveling distance as along a line between separate points, we have merely changed realities. The congruity remains the same.*

I laughed. *Like stepping through the frames of a closed picture book? Sorry, but I can't buy that. It just isn't good science to look for far-out explanations when there are simpler ones at hand. A man named William of Occam taught us that.*

So you believe instant relocation across perhaps light-years of distance is more logical than no spacial relocation at all? Strange reasoning, my human friend.

Who said instant? As far as I am concerned, what we think of as yesterday could easily be a hundred years ago. E still equals mc².

Ah . . . As the intruding thought faded, I jerked out of my trance and stared astonished at my supine companion. "Bertram?"

I know, I do not understand it either. How, for instance, did you learn to converse in my language? And so quickly?

"But I didn't . . ." As the words faltered in my throat, my bewilderment found an echo. For long seconds, two patterns of confusion whirled within my brain. Then:

I think we have been changed.

Yes. I stared, not seeing.

Unfortunately my body still resists my will. But I do not believe there is any serious damage. I will regain control soon.

"No hurry," I muttered. "Neither of us is going anywhere."

You are too negative. If my perception of our situation is correct, I believe a return is quite feasible.

"That's nice," I said sourly. "Of course, you have a four-kilometer ladder neatly stashed in that wingship of yours."

A most impractical idea, the thought returned seriously. *But there is a signal device with a vertical range of several kilometers. It contains a small recording unit, plus an abbreviated time transmitter designed to transmit its message at the peak of trajectory. Would you oblige me by retrieving the device from the wingship?*

Despite the impossibility of Bertram's congruity theory, hope lent wings to my feet as I ran to the disabled wingship. I found the device in the undamaged rear section. It was small, bazooka-like, with a ring sight and something resembling a trigger at the lower end. Under Bertram's direction I dictated our situation into a tiny microphone which pulled out from beside the trigger. Then I lifted the device to my shoulder, aimed, and fired. There was a slight

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shudder, and with a whisper of sound something streaked out of the open end and vanished skyward.

After a few seconds, Bertram asked, *Did you see anything unusual?*

"No. Should I have?"

I am glad you did not. After the message has been transmitted, the device self-destructs into a bright and long-lasting flare. Because you did not see such a flare, I assume the device has successfully traversed the congruity. Now we wait.

For how long? I wondered bitterly. I voiced my doubts aloud. "For ten years? One hundred?"

Bertram did not answer. In fact, he did not communicate again until about twenty hours later, after a night filled with unfamiliar stars. I had just drunk from the glacial stream which trickled down the valley, and was wondering if I dare bite into a yellow-brown fruit I had plucked off a nearby bush, when I heard a weak voice.

"Somezing comes . . ."

It had not been, exactly, a linear transmission from one world to another across a distance which happened to be several thousand light years. Neither had it been, exactly, a sideways movement to a parallel universe. What it had been, though not exactly, was a composite of both—a transfer through a continuum which, though multidimensional, nevertheless lacks the familiar dimensions of space and time. For those with minds of the scope and power necessary to understand its unpredictable convolutions, the continuum offers instant access to the pasts, presents, and futures of all the places in the physical universe—and also the ultimate power to influence infinite possibilities. But because it is an axiom of nature that high-powered intellect must always be balanced by an equally potent ethical sense, a certain race of quadrupeds reached out from their own doomed world and created—for the benefit of two promising younger cultures—a planetary "gateway" to nearly twenty thousand fair and uninhabited worlds throughout the galaxy.

The bait being set, the builders waited. First the Phuili came, and then Man. Warily the two races co-existed on the gateway world, aware of their differences, unaware of the hidden plan which made those differences complementary. According to the plan, an object completed its long fall from the cometary halo of a distant solar system and entered a transfer nexus above the scorched surface of a planet long ago rendered lifeless by its errant sun. Within a span of time too small for even theoretical meaning, the object emerged out of "Eight-o-three" on the gateway world and spectacularly terminated.

The quadrupeds' calculations were not perfect; they indicated to no more than a ninety-seven-percent probability what the response would be. But when a primitive missile soared into the nexus known as "AA One," they knew their plan was on track, that they could finally close "Eight-o-three" and permit their ancient home the precious dignity of anonymity. Soon, through a few gates and then through thousands, a vibrant new duality would spread into the universe.

As with all great events, however, there must first be a beginning.

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* * *

. . . and then, like a shadowy echo, Bertram's thought. *Something comes.*

Startled, I turned. Bertram was half sitting up, one arm pointed shakily skyward. I looked toward the light above the AA just in time to see a colored parachute blossom like a huge and lovely flower. I ran crazily in the direction the chute was drifting, by some miracle not breaking my neck as I dodged rocks and boulders. Finally it bumped to ground ahead of me, a large container covered with Phuili symbols. The chute was still settling downwind as I feverishly snapped back the container's fastenings and pried up the lid. The first thing I saw, neatly taped atop the supplies within, was a note from Jenny.

See you soon, love. ■

Ben Bova is perhaps best known to Analog readers as the magazine's editor from 1972 to 1978, as well as the author of a good many noteworthy books. But Ben also appeared in these pages before his editorship with a variety of both fiction and nonfiction, and as you've probably noticed he's started coming back to is old home rather regularly. Next month's "Floodtide" is, I believe, his first cover story. It's a big, rich, thought-provoking story of a man placed puppetlike in an environment a long way from home, knowing little more than that this has happened before and that he has a monumentally important job to do. That job is made all the more difficult by the fact that, at the outset, he understands only dimly what it is and why it's so important.

I can't resist mentioning (as I did, to Ben's surprise, when I bought the story) that the story is also a good example of something which Ben himself has often advised beginning writers not to try because it's so hard to pull off. Let the fact that he *did* pull it off so well serve as a reminder that almost any general advice can be broken to good effect—by a good enough writer. Next month's fact article, in its own way, is another example of the same effect. It's called "The Unseen Universe: Quarks and the New Ether," and when Kei Moriyasu first approached me with the idea, I told him frankly that I doubted he could treat such esoteric subject matter in a way that was clear and readable enough for Analog. But I think you'll agree that he did.

IN TIMES TO COME

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AXES, SAWS, AND ALPHABETS

Margaret M. Bishop

We commonly think of "technology" as "hardware"—but one of the most important technologies, perhaps too seldom recognized as such, is a very ancient form of "software."

The alphabet was invented some 3,500 years ago when people began to notice that a language is spoken by combining and recombining a small set of distinctive speech sounds (phonemes), and that each phoneme is produced by a characteristic mix of oral position and vocal effort. The moment this is clearly grasped, all it takes to record spoken messages on paper and then play them back is a specific written symbol for each phoneme.

In order to use the alphabet, the writer notices which phonemes he combines in what order as he pronounces a syllable, and puts down the appropriate letters in a corresponding order, creating a phonogram. In this way the writer gives the reader detailed instructions as to which phonemes to pronounce in what order so as to reconstruct the syllable orally. The writer continues, putting down phonogram after phonogram, copying what his own mouth is doing, until the message is complete. By carrying out the writer's instructions, phonogram by phonogram, the reader pronounces, and thereby hears, the entire message.

Nowadays, we also have tape and disc technologies for recording speech and playing it back. But writing contin-

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ues to be an essential recording technology in this modern world.

That is why it is so alarming to discover, as the press periodically does, that anywhere from 25% to 40% of the American public cannot read well enough to follow the directions on a medicine bottle or fill out a job application. The numbers vary as different investigators try different methods of probing the situation. But the data reflect a reality with which any professor or employer is only too familiar—that far too many students and job-seekers are handicapped by deficient literacy. Worst of all, this deficiency, whether severe or relatively mild, occurs in people who have completed eight or more years of school in these United States. How did this come about?

The answer is very simple. The schools have not been teaching children what the letters on the page are for or how to use them. Instead, they have been requiring children to memorize each printed word as a visual unit and associate that visual memory with the set of meanings appropriate to the corresponding spoken word. The schools have been teaching the reading of English as though it were written in ideographs like Chinese.

I call this the ideographic method. The educationists call it the eclectic method nowadays. They used to call it the whole-word method until public pressure forced them to add a few "phonic generalizations" (information about letter-sounds). But they don't teach the children how to play back the phonograms in which letters are combined to record syllables. Besides, they delay their "phonic generalizations" until after the child is convinced that reading is a matter of visual memory for the arbitrary jumble of letters in each word of the language. (An educated adult needs a vocabulary of some 17,000 words, not counting the specialized terms employed in the arts, trades, or sciences which he pursues.)[1]

Of course, no child can learn to use the alphabet if his teachers ignore the entire basis of the alphabetic technology, and instead treat each clump of letters as a unique, unanalyzable symbol having only a peripheral relation to the phonemes of speech.

But, you say, many children do learn to read at school. So it seems. But this is a cruel illusion. For those children, somebody at home let the cat out of the bag. Somebody "interfered" with the school's efforts, told the child that the letters stand for sounds, and showed him how to pronounce the phonograms in order to hear the author's message. Many of the better-educated parents help their children in this way when the children begin to flounder at school. Many others teach a pre-schooler to read without even realizing they have done so, simply by giving straight answers to straight questions the child asks about the workings of the letters in books being read aloud to him.

But those who get no help at home cannot learn. Instead of learning letter-sounds, they learn to guess at the main ideas by interpreting elaborate illustrations and to ignore the punctuation, suffixes and "little words," all the details which show how the main ideas are interrelated. As for writing, all they are

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taught is to memorize, letter by letter, the spellings of the most frequently used words.

Teaching a child to use letters as though each letter-clump were an ideograph is like teaching him to use a saw as if it were an axe. When he tries to chop down a tree, he will ruin his saw before he makes more than a few scratches on the bark. The harder he chops, the worse mess he will make of his saw, and the more his heart will break.

The ideographic approach is an aberration which began to take possession of elementary school teachers almost two hundred years ago and continues to possess them to this day. Indeed, according to the heavyweights of the educational establishment, this method is the distillation of the most up-to-date findings from all fields of science as they relate to reading instruction. How could such a situation have developed, and how can it maintain itself?

At first, learning to read was a simple matter. The letters had been borrowed from existing ideographs which were plain enough to be understood *as ideographs* by ordinary people. Thus, A, then written , was the ideograph for *aleph*, the *bull* which it represented. B, then written , was the ideograph for *beth*, the *house* which it pictured, and so on. Each letter was a clear ideographic representation of a word beginning with the speech sound the letter was to symbolize.

The would-be reader had only two steps to go through. First, he had to memorize the list of selected ideographs. Then he had to practice writing and pronouncing phonograms like *a, ba, da, fa: e, be, de, fe*, etc. A little practice with this, and he could read and write anything, for words in the ancient Western languages using alphabets consisted mainly of strings of two-sound syllables, with only an occasional three-sound syllable to complicate matters. Consider *Is-ra-el, Vir-gi-li-us, E-ros, A-the-na, Ci-ce-ro, Pla-to.*

This was the *alphabetic method*: Learn your letters, drill your phonograms, and off you go! It still works fine today for the modern alphabets of Italian, Spanish, and Russian.

This method does not work so well in English, where we use a slightly expanded version of the Ancient Roman alphabet to record some forty-four separate phonemes. Worse still, the Great Vowel Shift which occurred while Middle English was amalgamating Germanic and Romance elements into Modern English endowed us with sixteen separate vowel phonemes to record by means of the five vowel letters. (I and Y are merely alternative ways of recording identical phonemes.) Worst of all, our simple two-sound syllables occur mainly in the adult, Latin-based words like *po-li-ti-cal* and *pa-ra-si-tic*. The childhood words of English include thousands of examples of one poor little vowel dragging three, four, or even five consonant sounds along with it: *trap, strap, straps, stands, blinks.*

Nevertheless, as long as tradition held sway, the alphabetic method was used unquestioningly. It was only with the Age of Enlightenment in the 18th century that teachers began to question the

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validity of the alphabetic method for English.

The Enlightenment brought with it a number of ideas pertinent to education—phrenology, humanitarian sympathy for the plight of children, the observation that the child's natural curiosity can be used to help him learn the facts and relationships he needs to know, and the notion that all children should be armed with the three Rs, regardless of sex or social status. These ideas seized hold of gentlemen scholars at a time when the ordinary British or American classroom was a pretty grim place.

The drill on one- and two-letter phonograms can be run through fairly quickly. But the drill on three-letter, three-sound phonograms containing short vowels becomes pretty tedious. Then there are still phonograms for the four- and five-sound syllables to do, as well as drills on syllables containing the long vowel sounds and the six remaining vowel sounds (with an average of four different spellings apiece for these last two categories). Finally, the words of irregular spelling fit only partially into the alphabetic scheme.

The children had difficulty mastering all those phonograms before starting to apply them to reading, as the alphabetic method dictated. Furthermore it was well known to the ordinary layman, whether parent or schoolmaster, that children were born under Adam's curse. They were possessed of a devil which could only be driven from their souls by frequent beating. Only Papists believed that infant baptism could exorcize that devil. When the demons of boredom, forgetfulness, or rebellion raised their heads in school, out came the cane or the birch rod.

Phrenology was a great advance, whatever we may think of it today. It convinced the majority of the enlightened that evil-doing resulted not from possession by the devil, but from inherited imbalances in the size of different brain areas. A child's mischievous tendencies were of purely physical (natural) origin and could be overcome by giving a little extra emphasis to instruction in the virtues he was short of. This first step toward a psychology based on nature was no sillier than the phlogiston of roughly the same epoch.

But phrenology could not do much to remove excessive drill or child abuse from the alphabetic classroom. Therefore, at the beginning of the 19th century scholars interested in education began playing with the idea of beginning with whole words instead of phonograms. They worked out materials to teach children some fifty words which would be of immediate use in small stories, and then to use those words to show the children the workings of the individual letters as sound symbols. This was a big improvement. It went a long way toward eliminating physical abuse, and was effective in teaching reading.

Under the leadership of the Swiss educator Pestalozzi (1746–1827), this approach became widespread in Germany and France, as well as in England. (German and French also present problems which make the alphabetic method awkward; French because of its variety of vowel spellings and its numerous silent letters, German because it shares

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with English the tendency to drape a great many consonants onto a single vowel sound.) Pestalozzi was active in applying to the classroom all the ideas of the Enlightenment.

Horace Mann (1796–1859) was an enthusiastic disciple of Pestalozzi's. But he did not import the reading methods directly from Europe. The method he espoused had been worked out by Thomas H. Gallaudet (1787–1851) on the basis of very successful work he had done at the Hartford Asylum for the Deaf and Dumb in Connecticut. This was a truly ideographic method; it matched written words and phrases with pictures to teach the deaf the basic concept of language and gave them a basic vocabulary of simple English letter-strings which they could read, and later use in conversation by means of the deaf-mute finger alphabet.

The real and important wonders he had worked with the deaf made Gallaudet feel that his method would be helpful to the hearing, also. Under Mann's tenure as Secretary to the Massachusetts Board of Education (1837–1848), Gallaudet's primer for normal children was tried in Boston. It became clear after some eight years that this ideographic approach, with its wholesale suppression of phonogramic knowledge, was having disastrous results.

Mann and Gallaudet were inspired by the spirit of experimentation as it was understood in the first half of the 19th century. But when the Boston experiment failed, and the Boston schoolmasters unanimously returned to the old method, the experience was not used to increase our knowledge of how to deal with reading instruction. Instead, there followed a bitter exchange of recriminations, with Mann calling the schoolmasters lousy reactionaries, while they called him a soft-headed visionary (all expressed, of course, in the more elegant phraseology of the time).[2] Ever since then, the Science of Education (Education majors graduate with a B.S.) has remained at about this level of rigor.

The alphabetic method, conscientiously carried out, involved stupefying drill with attendant disciplinary problems. But it is not really very difficult to work out systems better suited to written English: systems which do show the children how the letters work and how to use them for pronouncing syllables and words, thereby hearing the author's message. These methods are known as *phonic* methods. (*Phonetics* is a tool of linguistics; *phonics* is the study of how the alphabet in current use in one's own language is used to record and play back the standard dialect of that language.)

Phonic methods require a certain amount of phonogram drill, but only about as much drill as is required in arithmetic for mastery of the basic addition facts. Besides, the drill can be interspersed with actual reading. By working first with ten to twelve letter-sounds and two or three absolutely indispensable irregular words memorized ideographically, you can get the first drills out of the way and then have simple stories for the children to read. This gives them a tremendous sense of power after only two or three weeks of school, and they are hooked as students.

From there on, the drills can involve

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only two or three new letters or diagraphs, with each new set increasing the available story vocabulary by a factor of two or three. By the end of first grade, they can read anything within their listening vocabulary, and spot, pronounce, and demand the meanings of words they have never heard before.

If your phonic method is well designed, you will also have taught them spelling, because one of the best ways to relieve the tedium of drill is to change back and forth between reading and writing with new phonograms. With twenty letters or so the children can begin writing stories of their own, and learning the rudiments of composition. Such methods are currently in use in about 15% of our public schools.[3]

But drill, even in small doses, was anathema to the gentlemen of the Enlightenment. Various phonic methods were developed soon after the alphabetic method became too distasteful. But they tended to be used in schools which did not accept the changes dear to the progressive education movement. As a result, phonics was always associated in the minds of progressive educators with reaction.

After the demise of Gallaudet's primer, the ideographic method disappeared for a while. Most American children learned to read from Noah Webster's *Blue-backed Speller*,[4] which represented a slight step in the direction of phonics, but still involved unacceptable quantities of drill and only a few very stuffy sentences for actual reading. So ideographic methods began popping up again. By the last decade of the 19th century they were fairly common and getting a big boost from philosopher John Dewey (1859–1952), who was an ardent supporter of progressive education.

In the spirit of Science, some schools soon began controlled experiments comparing ideographic with phonic methods. But these experiments were pitifully inadequate as science. One of their chief shortcomings was that they usually lasted only a year or two. Most children, however, can halfway master the few hundred word-ideographs that are taught in the first two grades well enough so that the "assessment instruments" (reading tests) used to conclude the investigations do not show up most of the confusions that are already present. These confusions really begin to snowball in the third grade and later, although this fact seldom emerges from educational experimentation.

But that is not the worst of it. In 1967 Dr. Jeanne Chall of the Harvard Graduate School of Education reviewed the experimental reports which had accumulated, a total of 85, most of them conducted in the schools, some of them in laboratories.[5] She found a consistent pattern among the school experiments. The data regularly showed that phonic-trained children did better than ideographic-trained children; but the experimenters regularly summed up their reports with the conclusion that the ideographic method was educationally more effective.

When Chall published her exposé of this situation, she was treated to the same kind of abuse that Horace Mann had heaped upon the Boston school-

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masters. She has fastidiously retreated to the Harvard Yard and turned her attention to other matters, while the educational establishment continues to swear by the conclusions she tried to debunk.[6]

The history of ideographic methods is loaded with examples of this type of non-cerebration and contempt for facts, and all in the name of Science. Isn't there a commandment against taking the name of science in vain?

Item: About 1912 Max Wertheimer proposed the concept of the *gestalt* as a way of understanding perception. His idea was that we perceive a new object or phenomenon first in its entirety, only later noticing its constituent details. He labeled the perception of the thing-as-a-whole as a *gestalt*. The ideographers seized upon this to claim that children naturally see each word as a whole, and that it goes against nature to force them to "synthesize" it by sounding it out before they have formed a gestalt concerning it and its meaning.

Notice the buried assumption which has crept in here. All of a sudden, the written word has become a natural phenomenon and stopped being a human construct recording sounds which can be played back by anyone who understands the alphabetic technology. Notice also that the ideographers are the only scientists who have found the gestalt to be a fruitful idea. The science of perception has left the gestalt far behind. Yet Education majors are still taught all about it, and how scientific it makes the ideographic method.

Item: In 1885 James McKeen Cattell, a pioneer laboratory psychologist, found through tachistoscopic tests that people need a longer exposure to recognize single letters than they do to recognize words.[7] The ideographers grabbed this to justify their methods without bothering to notice that Cattell's work was done with adult readers, or to ask if beginners would yield the same results. No, Cattell had proved that readers perceive words by overall "configurations," a favorite ideographic approach to word memorization: *House* looks like house, and *candy* looks like candy. But how do you tell house from horse? Children trained ideographically *can't*, as any remedial teacher can testify.

Item: The ideographers would argue that the configurational similarity of *house* and *horse* is unimportant because the context of words and pictures can be used by the child to differentiate between the two. "Use of context" is another prime feature of ideographic methods. Indeed, approximately one-third of the instructional time devoted to reading in such classrooms is devoted to the idea of "context clues," and to practice in using them. I know, however, of no scientific studies designed to discover whether or not children *need* to be told to attend to the context.

I suspect that the absence of such studies reflects the zero value of the question. Can it be imagined that anyone can speak, understand, or read English without being constantly tuned in to context? The word-order grammar of English is such that context alone determines whether most of the one-syllable words are functioning at any given moment as nouns, verbs, or adjectives. Take the sentence, *She had a run in her*

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stocking. If you react to *run* as a verb expressing the action of the sentence, you are in trouble. Badgering children to "use context clues" is like badgering them to breathe, or to circulate their blood. It is *not* a scientifically based enterprise. Yet this is what teachers' colleges teach.

Item: Ideographic methods have always been associated with progressive education, but this progressivism is not appealed to for quieting worried parents. You silence them by pointing to the irregular spellings which exist in written English.

The hue and cry about these spellings was first raised by philologists before language study had matured from a natural philosophy into the science of linguistics. But Leonard Bloomfield, the father of American linguistics, maintained that these irregularities only made it doubly important to use phonics in teaching English reading, so that children could see that the irregular word usually has a false letter-sound for only one of its phonemes. See Hanna *et al* on the actual degree of irregularity in English spelling.[1] Such problems affect only 11% of our words, not 20% as teachers are taught to believe.[2]

Are teacher candidates taught anything else besides the above items of pseudo-science? Sure. Lots more pseudo-science, mostly to the effect that if the child can't learn "his words," or guess well enough to follow the story, it is because he suffers from "word blindness," or dyslexia (a Greek coinage for *inability to read*),* or "minimal brain damage" (damage too slight to be medically detectable), or "specific language disability," or hyperactivity, or any combination of the home disruptions which characterize the lives of children in our decaying cities or their domestically unstable suburbs. They also learn how to explain to the phonics-oriented parent that if the child is asked to apply his "phonic facts" by sounding words out, it will be almost impossible to overcome whichever of these problems they happen to be using to explain his difficulties.

From the beginning of this ideographic misadventure, parents have been distressed by the difficulties children faced and the labels so generously distributed to explain the problems. But for years the supposed professionalism of progressive educators held parents mesmerized. Public discontent, however,

**Dyslexia is indeed a neurological disorder. It was first identified by the neurosurgeon Samuel T. Orton in the 1920s. Neurophysiologists are only now beginning to understand the nerve-connection problems which characterize this condition. Dr. Orton maintained that neurological dyslexia affected only about 2% of children. He found that the best treatment for these cases was to teach them with systematic phonics, only taking it more slowly and more carefully than with ordinary children. The Orton Dyslexia Society, which was founded to spread his treatment, maintains that most of the children brought to them have no neurological disorder, but have simply been disabled as readers by ideographic teaching methods. It treats these cases by retraining them with ordinary phonic methods.*

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was widespread by 1961 when a few citizens organized the Reading Reform Foundation (RRF)[8] to promote the use of phonics methods in the schools, to help parents rescue their own children, and to help guide the many scattered teachers who are as distressed about reading as the public is. Thanks to this movement's moral support, there are now a great many effective, attractive (and entirely "progressive") phonic methods on the market, and thousands of teachers have received training in their use. But 85% of the public schools still ignore these materials, and the opposition to phonics from the edcuational establishment is as adamant as ever.

By now the problem has become one of vested interests complicated by bureaucratic inertia. Early in the 20th century, when progressive education became the thing, publishers began bringing out ideographic textbook series. Several publishers built their empires upon this business, bringing the leading pedagogues of the day into their stables and paying handsomely for the privilege.

This was a gold mine. For the method's failures make it necessary continually to revise the reading textbooks and all other schoolbooks, always reducing the vocabulary (ideograph) load so as to accommodate the declining reading abilities the books produce. With both authors and publishers ballyhooing the scientific validity of their method, it is easy, through revision after revision, to dominate the entire public school market, both for the basic schoolbooks and for the tons of remedial materials that teachers demand to help "treat" the reading problems that keep cropping up.

This vested interest—plus the bureaucratic inertia of the educational establishment, from teacher's colleges through state and local schoolboards down to the individual classroom—are the chief obstacles to change. Another problem is that RRF, the one organization campaigning for a change, is composed chiefly of housewives who have been drawn into the movement through success in their personal efforts at rescuing their own children. Many of them go on to teach other children, and some develop materials of their own. But their talents lie in the area of teaching, not in the areas of organization or of public relations.

Compounding this problem is the incredibility of the whole situation. The mere fact that the tale they have to tell is true does not prevent it from being so bizarre that few people can believe it without personal experience with the cure of a disabled reader.

Indeed, that is how I became aware of it. I was myself a victim of the ideographic method. Until the age of 36, I suffered the tortures of reading and spelling disability. Then I stumbled upon a teacher who used phonics to straighten me out. I was not dyslexic, merely disabled by the schools. For the past 25 years I have been teaching remedial reading with phonics. I *know* the agony of reading disability, and I *know* how unnecessary it is.

Aside from all the personal tragedies, one of the worst consequences of the situation is its effect upon science education. My experiences with hundreds of students convince me that it is the best and the brightest who are most

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surely crippled by the ideographic method. When children with inquiring minds cannot get a straight answer on how to tell *house* from *horse*, or on how to distinguish countless other visually confusing pairs, they give up trying to learn and tag themselves as intellectually deficient. Every time this happens a potential scientist, technician, historian, or other professional is lost.

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8. Reading Reform Foundation, 7054 Indian School Road, Scottsdale, Arizona 85251.

● Physics is said to be very difficult—even physicists believe this. But if we make an elementary distinction between creating new physics and understanding what others have done, physics, perhaps, requires no more patience or intelligence than poetry, foreign languages, or any of a dozen other products of the human imagination. It is the reward that differs. . . . There is drama in the creation and power in the result, but our admiration for the work itself can be excited only by its elegance, consistency, and esthetic wholeness (as perhaps is true for the somewhat mythical pure novel).

Leon N Cooper

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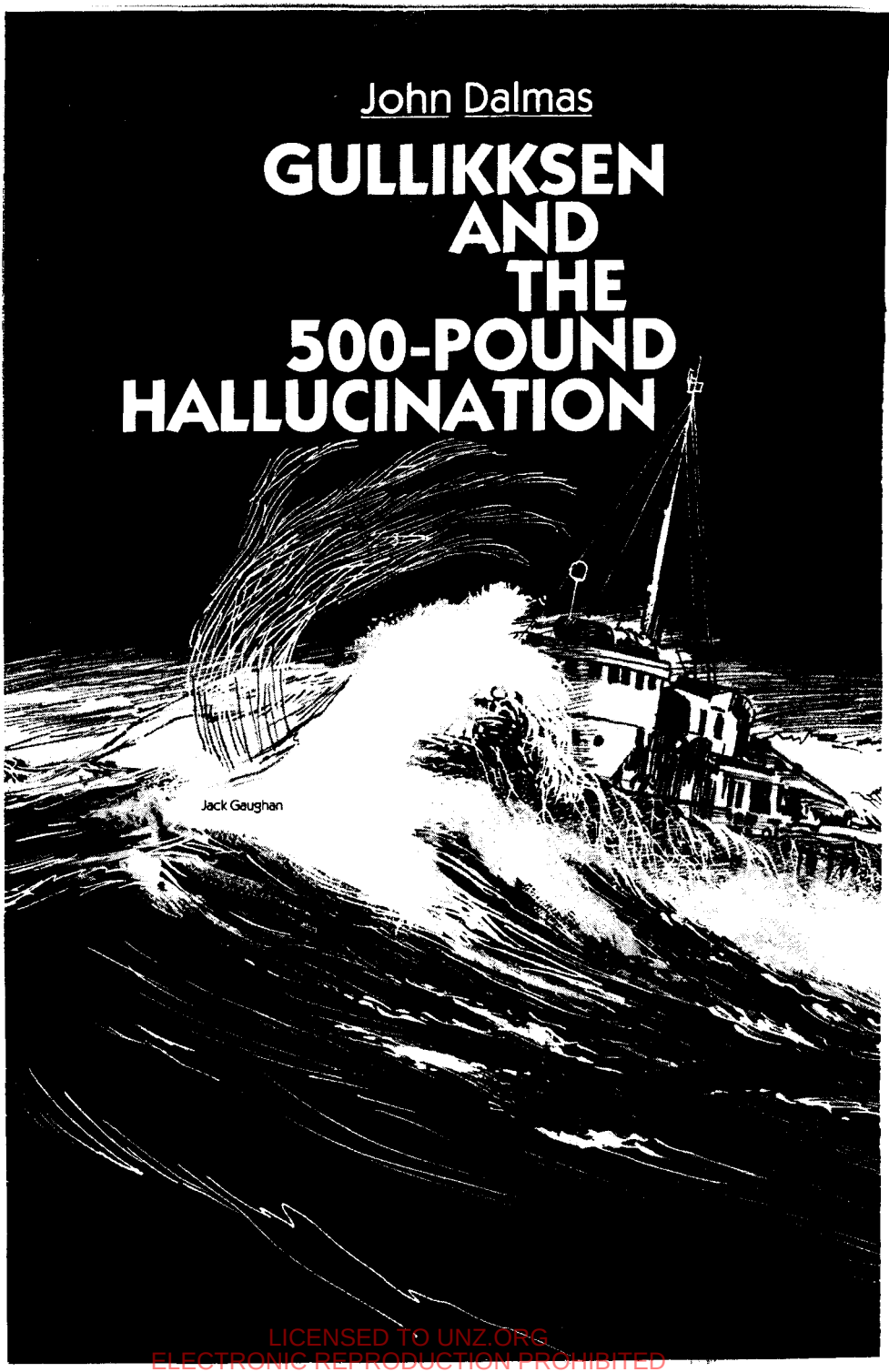
John Dalmas

GULLIKKSEN AND THE 500-POUND HALLUCINATION



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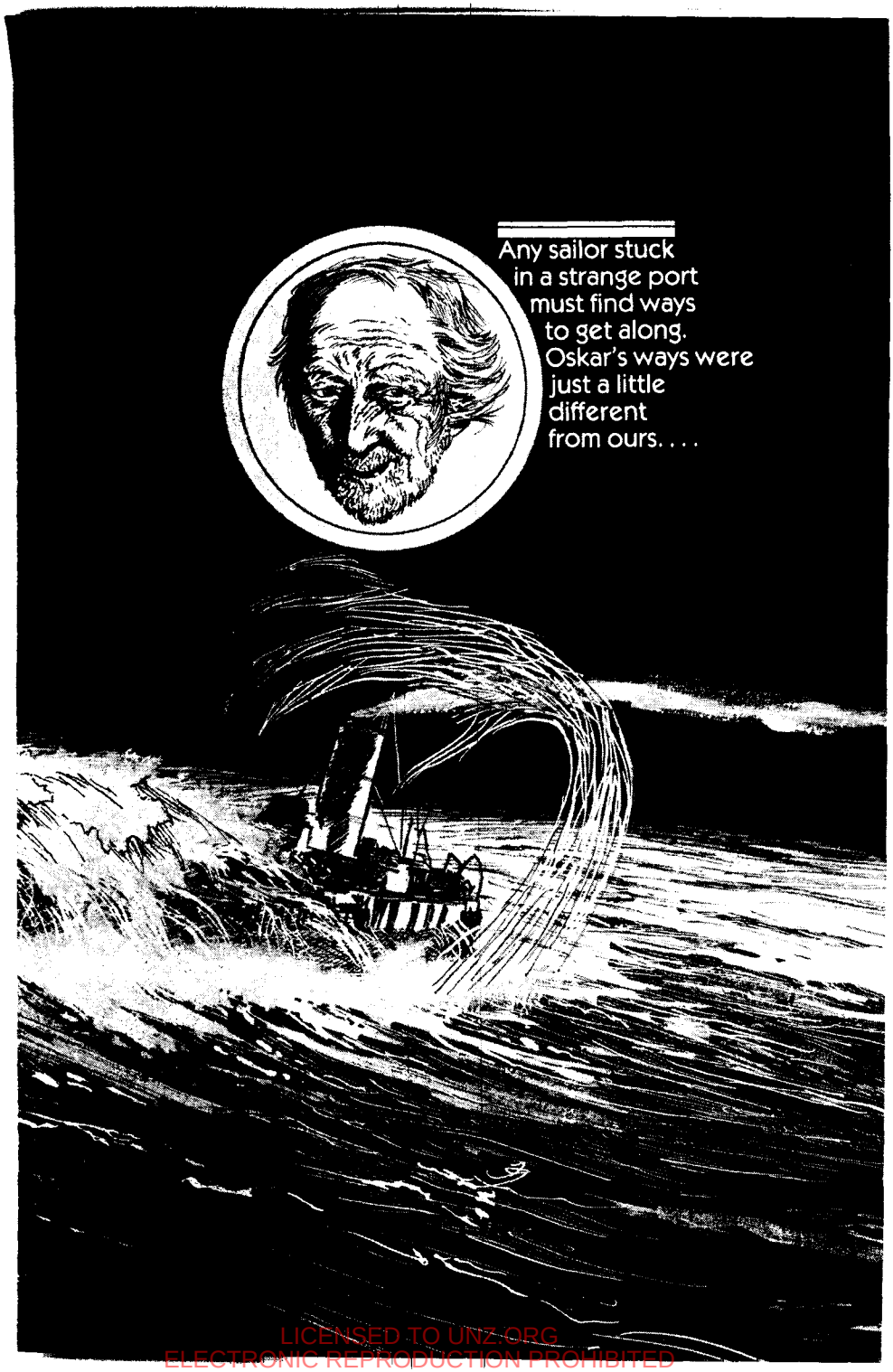

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I knew right away there was something peculiar about him. I mean, who ever heard of a Norwegian heaving coal in the firehold? Swedes—Swedes by the scores. Finns by the dozens. And Irish beyond number, as witness myself. But norskis sail on the deck or in the wheelhouse, not in the firehold.

Except for one: Ingebritt Gullikksen.

We did have some strange crews on the Great Lakes during the war. After enlistments and the draft took their shares, big bonuses to be made on the salt water took part of what was left.

Meanwhile the steel mills were running round the clock. Gold was lovely and silver was nice, but *iron!* Iron was *important!* So every old hull that would float—some of them rusting at the dock since 1930—every hull they could find was more or less reconditioned to haul iron ore down from Lake Superior. An example was the steamer *Henry K. Anibal*.

And every old sailorman that could stagger into the hiring hall was sent out on a job. Then, if they could make it up the ladder from the dock, they were signed on. On top of that, they were shipping out fifteen-year-old kids who were so green they thought "binnacle" was a card game and a bunker was somebody sleeping. A strange and lively time.

Gullikksen came aboard in late September 1943, at Duluth of course, a gaunt old man with great big bony hands, thin white hair, and face the color of blotchy bread dough. I was on deck at the time, and I remember wondering if he could possibly do any useful work. It looked to me like the hearse would have to meet us when we arrived at the Soo.

That was because the sun was shining, and I couldn't see all there was to him, or around him, or with him, or however you want to put it.

I had nothing against age. My grandfather was old, and my father was getting that way, and I knew if I was lucky I'd be old myself someday. And old Inge might have been a hell of a man, thirty years earlier when he was maybe fifty.

But you never saw the firehold on one of those old hand-fired buckets, or felt the heat! The heat! In front of you the tall faces of two great boilers, and at your back the bunker doors, with ten frieghtcars of coal feeding down through them. With a couple of number six scoop shovels, known for good reason as Irish banjos, and other tools of ignorance. Ignorance—but skill.

You'd average shoveling about seven tons of coal a day, plus a ton or two of wet ashes. But that wasn't the hard part. The hard part was cleaning fires. In 110 or 115 degrees of heat. A hundred and twenty on the *Henry K. Anibal*, which was nicknamed "The Hungry Cannibal" for the way she ate up coal and firemen, with the lagging falling off her boilers and all.

And Mickey McKinney, the chief engineer, didn't help any, with his love of free whiskey. Any bandit at a coal dock could sell him a shipment of the worst slack, or even overburden, telling him it was number one bunker fuel. All he needed to do first was pour two or three drinks of good whiskey down him.

The whiskey had to be good, though; you couldn't fool him on that. The best

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trips I made on the Cannibal was when someone tried to slip him cheap whiskey. That got his Irish up, and we'd sail with the loveliest nut coal you could ever put shovel to.

But we were burning twenty percent slate when Gullikksen came aboard —Gullikksen and his—well, I'll get to that. It was the worst coal I ever saw.

Now I'm a man of principle; I am now and I was then. There are those who call it stupidity. When I signed on a ship, I stayed with it as long as they treated me like a man. I didn't quit just because the weather turned hot and sent the firehold temperature out the top of the glass or the cook turned ugly and went on a baloney strike or we'd docked at South Chicago or Conneaut—one of those real fast docks—and I was struck with terminal thirst and no time to slake it.

I was a homesteader. I'd fit one out when the ice was melting in March and lay her up when she froze to the dock in December. Almost without exception.

But with a steamer like the Cannibal, and the kind of coal we had, if I'd realized that Gullikksen had come aboard as my firing partner I'd have quit then and there. I'd have known for sure that I couldn't keep steam up working with a stove-up old wreck like him.

Which showed how much I knew about Gullikksen.

We were out on deep water when I went to go down on watch. I didn't realize old Inge was my new partner until I found him at the head of the ladder, waiting to go below. Then I got so mad I couldn't even talk to him.

But he went down the ladder lively enough, and in the dimness of the firehold he didn't look as frail as he had. There was that about him, you see, that only showed up when the light was poor.

The first thing we had to do was clean the fires, the hardest, hottest part of the watch; and to my surprise it went okay. I'd been afraid I'd have to clean his too, but he cleaned his own, whipping out the glaring, fuming, stinking piles of red-hot ashes and clinkers as fast as I did mine. And in the flame and smoke and steam, he actually looked burly and stout.

When we'd shovelled the ashes into the hopper and out into the lake, and blown the flues, I got my next surprise. "Vy don't you go up and cool off till five?" Inge said. "I vill handle it alone and then ve can svitch."

Well, there was nothing unusual about that; it's what firing partners usually do. But I hadn't thought I'd be able to with him. Still, I left by way of the engine room, to let the oiler know that old Inge was down there alone. He nodded; he'd come out on deck and get me if I was needed.

When I went back down at five Inge was perched on the water barrel, watching the steam gauge, which was sitting right on 200 pounds' pressure where it was supposed to be. And I couldn't believe how big he seemed in the weak light down there. Big enough that I looked him over carefully.

When I looked carefully enough, though, I saw a gaunt, used-up old man. It was as if he had a kind of shadow that, at a glance, made him look bigger. He grinned a toothless grin, stood, and went up the ladder two at a time. Then

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the needle started flickering and I picked up my shovel, hit some fires again and forgot about him.

The rest of the watch went fine too, with long breaks on deck cooling off. After a shower I went in to hit the rack. Inge was already in bed, reading a copy of *Duluth Skandinav*. I wondered if he had his sea bag in there with him. He bulked the cover up as if he weighed 500 pounds.

"How'd it go?" I asked him.

"Yust fine," he answered cheerfully.

"To tell the truth," I said, "I was afraid at first that you might not be able to take it down there. How old are you?"

He chuckled. "It don't matter. I'm seventy-eight, but it don't matter. I got a friend that does the vork for me."

"A—friend?"

"Ja. Didn't you see him down there? I t'ought maybe you could see him."

Oh my God! I thought, *I've got a bughouse for a partner!*

"You t'ink I'm nuts," he said, and chuckled again. "Oskar, I vant you to meet Jimmy Mahan."

I looked around for Oskar, but all I could see was me and Gullikksen. Until the covers raised up off him. Even though he was just lying there. Then something like an arm made out of smoke reached out, with a gray hand bigger than Inge's on the end of it. I could see right through it.

Hesitantly I reached out and shook with it. The only time I'd done anything like that before was after two weeks of heavy drinking. It shook hands firmly, and I knew it was being careful not to break my fingers.

"Wirra wirra wirra!" I said, and crossed myself. "What is it?"

"I don't know. I mean—I *know*, but I don't know how to tell you. I don't know the vords."

"What do you mean—you know but you don't know the words?"

"Vell, he don't talk. You yust sort of know vhat he's t'inking. You can do that vit' him." The old man's eyes twinkled. "Go on; try it."

"Some other time," I said, wagging my head back and forth. I watched the "arm" disappear back under the cover. It didn't seem to fold back in. It was more like it just flowed back in on itself.

Then I hung up my towel and went to bed. But not to sleep; not right away. Instead I lay there and thought for a little while. Then I spoke quietly, hardly more than a whisper, so that if Gullikksen was asleep it wouldn't wake him.

"Inge."

"Jaha?"

"Where did you get him?"

"You mean Oskar?"

"Is that what you call him? Oskar? Where did you get him?"

"It vas yust after New Year's, and I was cookee at Mando's Camp T'ree, a logging camp up in Koochiching County. And the cook sent me out vit' a horse and sleigh to haul up a load of stove wood one of the cutters piled up for us. But before I got there I had to pass this little lake, and I could see that somet'ing had vent t'rough the ice. There vas a big place of new ice in the middle, vit'out no snow on it yet, and all around I could see vhere vater and pieces of ice had splashed up.

"And I t'ought, Yesus Christ, vhat

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could have done *that*? Because the ice vas about t'ree feet t'ick, you know.

"And then I felt him."

"You *felt* him?"

"Sure. You can't see him in the sunlight. And he vas veak and sick, you know, from the explosion and the crash. He vas in a ship, you see, like a small boat really, that come from some star.

"The stars is like the sun, you see, and got things going around them like Earth, vhere people live."

"Planets," I said helpfully.

"Jaha, planets and animals and everything, yust like here. But different."

"Did he tell you all this?"

"Not in vords. He yust kind of lets me know stuff. It's easier than talking."

"What—what does he eat?" I asked. "Or does he?"

"Vell, not exactly. He kind of gets power from t'ings, you know. Vhen I told him it vas all right, he kind of touched me and the horse and got a little bit from us. That saved his life. He vas veak and hurt from the crash, and then he'd been making do vit' spruce trees for a couple days. But trees don't really have much in vinter; he vas yust about dead.

"Besides, it's hard on him to not be connected vit' a person."

"A person? Are there human beings where he comes from?"

"Ja, pretty much. There vas vun that vas pilot on the ship he vas on."

"So Oskar wasn't the pilot then."

"No. Oskar vas the enyine."

The—engine. I just kind of lay there. It was all so strange that I couldn't even think much about it. Too strange for thought.

"Uh, Inge, does he still take energy from you?"

"Huh? Oh, a little bit. It's kind of like he needs that—vhat's that vord again?"

"Energy?"

"Ja. He needs a little of that from something live. But he gives me a lot more back. Mostly he gets vhat he needs from the boilers here. He vas so veak, you know, vhen I found him, and I bet he didn't veigh more than a couple ounces, but he got stronger fast vhen he could be by the stove. And vhen ve vas on vatch together, me and you, I could feel him getting stronger and stronger. Those boilers are good for him."

Inge chuckled. "He *loved* helping me clean fires. Maybe tomorrow ve can clean yours, too."

Clean my fires! Wirra! Cleaning fires is the worst job on the ship, and him seventy-eight years old.

"It ain't hard on me," he went on. "He does the vork; I yust chip in the know-how."

"Why doesn't he just stay in the boiler room? Instead of coming up here with you?"

"He likes company, and I'm kind of his pal, you know. Maybe he'll go down vhen I'm asleep. Vould you like to do that, Oskar? . . . He says he's going to. And he is learning about my body so he can fix it up good for me."

Then I heard Inge yawn, and the talk petered out. I went to sleep thinking about Oskar lying on the boilers getting bigger and bigger.

Even on a tough steamer like the Cannibal, and with the worst coal I ever saw, the trip went surprisingly good

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with someone else cleaning the fires. In fact, he'd even clean them an extra time, which made it easier to keep steam.

Pete the Leech was second cook, and he didn't like old Inge: bad-mouthed him and gave him a bad time. Accused him of having the world's biggest tapeworm—that it was indecent for someone that old to eat so much, especially in time of war. Gullikksen did stow the chuck away, all right, but there's nothing wrong with that. And he didn't eat much more than some of those hollow-legged teenagers aboard.

So I decided that when we docked in Ashtabula I was going to catch Pete on the dock and slap the snot out of him. He wasn't going to talk about my partner that way. But when I mentioned it to Inge, he said not to. He said that everyone knew what Pete was like and that no one believed what he said, which I had to admit was true.

We were lucky in Ashtabula; we had to wait for a dock, which gave us more time to go up the street and wet our whistles. It was ten in the morning when we got to Turpeinen's Anchor Bar. If it hadn't been so light, what happened there might not have. But with the sunshine flooding in those big front windows, and us sitting in front of them, there was nothing strange to be seen about us.

I figured we were in trouble when I saw this big guy look at us from the bar. I'd sailed with him—Jailhouse Olson. He was about six-two and more than 200 pounds, with red hair and fists like cannonballs. He should have been Irish. Friendly enough, ordinarily, but give him one drink and he turned mean. He seldom finished the second drink, and I don't think he ever drank the third. He always got in a fight before that. He knew the inside of every jail from Lackawanna to Allouez.

He was looking at us, and I could tell he didn't like what he saw. Pete the Leech was sitting next to him, grinning, and I'd have bet he'd been telling him lies about us. Olson scowled, stood up, and came over.

"Which one of you is Inge Gullikksen?" he asked. I knew it wouldn't make any difference; I was the one he was going to beat up. He'd never hit an old man, whatever Pete had said.

"I'm Gullikksen," old Inge said with a friendly toothless smile. He got up and pushed his right hand out, as if to shake hands, and Olson was so surprised, he let it wrap around his before he could do or say anything.

I never saw anything like it. At first he looked startled, then puzzled, as Inge pumped his hand. Then he got this kind of absent, pleased look, smiled, nodded real friendly at Inge, said he was pleased to meet him, nodded to me and walked back to the bar.

I saw Pete whisper something to him. Olson stared at him, took the cook by the front of the shirt, punched him right in the face, nodded to the bartender, and walked out. Pete sat on the floor, blinking, and bleeding all over his shirt, then waited a safe interval and left, holding a handkerchief against his busted mouth.

We never did see him again; he went back to the ship, packed, and paid off before we got back. Which made him luckier than most of the crew. Meanwhile I was beginning to appreciate Oskar more and more.

But it was three days later that I really

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came to appreciate him. We'd left Sault Sainte Marie about twenty-four hours before, running against the first storm of autumn. It was blowing hard when we left Whitefish Bay, but far from dangerous. We had a chance to take cover twenty hours later, in the lee of the Keweenaw Peninsula, but there didn't seem to be any reason to. It was just another storm; nothing to worry about.

It was a couple of hours farther along that it got really bad. I realized *how* bad when the seas started sweeping the deck one after another and slamming against the deckhouse so that we dogged down the deadlights. And how I got to the crew's mess was, I waited till I heard one wave hit and then ducked out onto the deck and ran for it before the next one came along. Of course, it helped that the seas were coming from the starboard beam and the galley was on the port side.

But as I ran, I saw something that really hit me hard: less than half a mile to port, rising on the top of a wave like some giant reddish-brown log, was the bottom of a ship's hull—another long freighter like the Cannibal had capsized. In the mess, everybody was pretty quiet; I guess we all saw it.

If anything, the wind got worse, and after lunch, when I went back to the room, I saw something that worried me really bad. Some of the hatch tarps had ripped loose, and one of the hatch covers amidships had started to tear up from the coaming, and was buckling. Guys were out there on safety lines trying to hammer it back down with sledge hammers. Lose even one hatch cover, and we'd take a lot of water fast in those seas.

It took only a second or two to see all that. Then the next wave was ripping along the deck, and I ducked into the firemen's quarters. "Inge," I said, "we're in trouble," and told him what I'd seen. "Can Oskar do anything about that?"

He put down the dog-eared copy of *Duluth Skandinav* and sat up with a belch. He'd eaten earlier and more than me. "I don't know. I vill ask him." Then he got this intent look on his face.

Oskar had grown a lot and didn't come in the room anymore. He just lay on top of the boilers, kind of spread over them like some kind of thick cloudy blanket. Knowing what to look for, I could see him when I was on the catwalk, and I'd think *hello* to him and he'd *hello* back. He even said/thought my name: *Hello, Jimmie*, he'd say to me. But he always kept a tentacle to Inge when Inge was up in the room, steel bulkhead not withstanding.

Anyway, Inge nodded, and about then the biggest sea yet slammed against the deckhouse. Oskar better come up with something good, I thought, or we'd all end up in Superior's eternal cold storage.

"What did he say?" I asked.

"He said don't vorry about it," and with that, Inge picked up his newspaper and lay back down like we were floating on a millpond.

That's easy to say, I thought, *but these old buckets weren't meant to take beatings like this, even when they were new*. And the Cannibal's engine had *Glasgow 1901* stamped on it.

Just then the door flew open and this kid fell in, dripping wet, his safety line in his hand. He was sobbing "Oh my

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God, oh my God." Right away I guessed what had happened: a wave had taken him over the side, and only the safety line had saved him. He was probably sixteen years old.

"It's okay," I said, "it's okay."

"No it ain't! No it ain't! She's taking water forward and the hatch cover ripped clear off!"

Oh Jesus! I thought, *don't let her be coming apart!* I looked at Inge, who'd put his paper down and was sitting up frowning. It looked like he was talking to Oskar like a Dutch uncle. Or a Norwegian grandfather. Then he gave a little nod.

After the next wave, the kid ducked out the door again, to do God knew what. Right after that the whistles started to blast, one after another, to abandon ship. There really wasn't much to choose between. If we went down with the Cannibal, we were dead. If we tried to swim in that icy water, we were dead. And I leave it to you what we'd be if we took to the lifeboats.

But orders were orders in those days. "Let's go, Inge," I said.

He smiled and shook his head. "It's going to be all right."

In spite of how ridiculous that sounded, it got my interest. "What's he going to do?" I asked.

"He's going to lift her out of the water."

Oh for chrissake! I ducked out the door and went up the ladder to the lifeboat deck. From there, the bunker lids being closed, I could see out over the length of the ship to the pilot house up forward. The ripped-up hatch cover had torn completely loose and gone over the side. The hatch, some fifty feet across and maybe fifteen feet fore and aft, was gaping wide, showing wet coal shiny black in the cargo hold. She'd swallow a ton of water with every wave, or maybe four or five, and a couple more hatch covers were buckling. I didn't know what other damage she might have taken. Guys were hurrying aft from the forward end, heading for the lifeboats, sliding their safety lines along the weather line that ran the length of the cargo deck.

Then I realized the next wave wasn't sweeping the deck; it was just licking along the edge. And as I watched, I could see the deck start to bow downward!

"No Oskar! No!" I shouted. "Put her back in the water, for the love of Jesus!"

By that time several other guys had come up on the lifeboat deck, and they looked at me like I was nuts. So I didn't yell out loud anymore, I just yelled with my thoughts. *This ain't no spaceship, Oskar. She's got to be in the water or she'll bust in two. She ain't strong enough to float in the air, even without 9,000 tons of coal in her hold.*

I got this response that felt kind of like *damn!* Then I realized that the twelve-to-four watch had come up out of the boiler room, leaving no one down below to keep steam up. And somehow that seemed important to me. Another wave hit the deckhouse so I knew Oskar had put us down again.

Two more guys were coming up the ladder, so I jumped the eight feet down to the maindeck and ducked into the firehold door and the deep cavern that was the firehold itself. Below I could hear the scrunch of someone shoveling coal, the ring of the shovel heel on the

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deadplate of a firedoor. Inge, I realized, was down ahead of me.

When I got to the bottom of the long ladder, I found him firing without Oskar's help, his gaunt old form bending, driving the shovel into the coal, straightening, pivoting, striding with the left foot, the shovel swinging into the furnace door, again and again. I guessed Oskar was too busy with other things to help Inge now. The steam pressure had fallen to 185, but it was holding. I picked up the other shovel and began to feed the portside boiler.

When the steam gauge read 195, I hurried between the boilers into the crank room and up the engine room ladder to check things out. The engine room was deserted, the engineer and oiler gone to the boats. But the condensers were doing just fine, the boiler water levels about an inch below the tops of the glass, and best of all, the pumps were running, including the big centrifugal pumps. Then I checked the journal temperatures and a few other things and went back to the firehold.

Inge was holding up good, and the gauge was at 197. The biggest problem was that we hadn't been able to shoot the ashes since Whitefish Point because of the seas, and the place was half buried with ash piles. We waited for the needle to start flickering and hit three more fires with coal. Then I went back up onto the lifeboat deck to check things out.

There was no one there. I saw one of the lifeboats rise on top of a wave behind us, then disappear into the trough. Another big wave hit the deckhouse, the spray drenching me again, and I looked forward toward the pilothouse, some 500 feet ahead. Another wave was running along the deck. There were three open hatches now, and the water washed over them without any seeming to go in, as if they were covered with glass or something. Oskar was working on it!

And somebody was holding us into the wind; somebody was at the wheel. That was Oskar too, I supposed. Then the safety valves let go behind me; I almost jumped out of my skin. I hurried back down to the firehold again, expecting to find Inge in trouble.

He wasn't, though. He was standing there with all six furnace doors open, their bright fires shining into the dark room. The induction fans were off and the ash pan doors were closed to cut off the natural draft. The steam gauge read 200 pounds. I had to bellow to be heard over the roar of steam from the safety valves.

"What the hell's going on?" I asked.

Inge grinned at me. "Oskar shut off the enyines," he said, "so the valves popped."

"Holy Christ! We'll broach and founder!" I dashed between the boilers into the crank room again. The great piston rods were still, their booming silenced, the eccentrics motionless; the only sound was the pumps and generators in the engine room above. I scrambled up ladders. Without forward speed—slow ahead at least—we were gone for sure. Our only chance was if they'd left a life raft; with a raft we had a chance. Maybe one in 10,000. It was incredible we hadn't broached yet. I'd know when we did: we'd start to roll and wallow, and end up capsized like that other we'd seen.

I came out onto the fantail and

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stopped, bug-eyed. We were moving faster than the Cannibal had ever gone before in all her forty years, leaving a wake behind her like a cruiser or maybe a destroyer.

And that's how it was all the way to Thunder Bay, where the seas were a lot less and we slowed down. Then I went up the long deck to the pilot house. We must have had some plates sprung, because streams of water as big as my leg were coming out the pump spouts. I found the captain at the wheel; it had been him steering us. He stared at me through eyes at the ragged edge of sanity. He'd not only lost twenty-nine officers and men; he'd seen the impossible happen, alone, and with no idea of how.

He didn't ask any questions, though, and I said nothing. I didn't think he was up to knowing, and neither did he, I guess. He dropped the hook near the docks in Fort William because he had no crew to handle winches or lines to the pier.

And there'd been no other miracles: the crew was never seen again. That great ice-cold lake doesn't give up her dead.

Back in the boiler room again, Inge and I sat talking. We talked to each other and sometimes we talked to Oskar. He told us he was ready to go home, wherever that might be. I guessed he knew.

He'd gotten a bit pooped pushing 560 feet of ship carrying 9,000 tons of coal through a ship-killing storm at about twenty-five knots. But he was recovering nicely. Ordinarily at the dock we'd have been able to run generators and pumps, and winches if necessary, with the fires banked. It doesn't take that much steam. But we had full-length fires, six of them, eight feet long and forty-two inches wide, and Oskar was soaking up most of that energy. By the time a new crew bussed up from the hiring hall at Duluth, he wanted to be all charged up to go back in the bush, raise the space ship out of the lake, repair it and reactivate the power unit, and in general get her ready for the long trip.

"Ja," said Inge, "and ve ain't got a lot of time. It's already the first of October, and in six veeks that lake vill be froze up again."

Something else was bothering me though, and suddenly I knew what it was. "Oskar," I said, "if the pilot was killed, who's going to fly it?" As soon as I asked it, I got this strange powerful glow that made my hair stand up. And it came from Inge, not Oskar.

"You?"

"Jaha."

"But do you know how?"

He was grinning like an old gray wolf. He and Oskar had been planning since last winter. It was why they'd gone to Duluth to ship out—to build back Oskar's strength. The spaceship, they told me, had everything Inge needed to live. And learn to fly her. It wasn't that hard.

And then they asked if I wanted to go along!

Inge paid off the old *Anibal* in Duluth on a cloudy day, and walked down the dock followed by a large dim mass that was plain enough to me but that most people wouldn't notice because they'd feel much better not to.

And I probably would have gone with them—I was a bachelor then, and there

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was nobody would have missed me that much—but I wasn't willing to quit the *Anibal*. I stayed with her and helped lay her up that December at the foot of Genesee Street in Buffalo.

That's the winter I met your grandma, God rest her.

Anyway, these last few days I've been having this feeling: as if Oskar and Inge were somewhere around, maybe in a big orbit around the Earth. Inge must be 120 by now, but I don't think that means much to him anymore.

Anyway, don't be surprised if I go away for awhile. That's why I told you this, so you'd understand and wouldn't worry. Don't tell your mother, though, because she'd get mad and say Grandpa's gone off his rocker. But I'd appreciate your telling your dad when he comes into port; he knows all of it already except the last part about Inge and Oskar being around somewhere again.

No, I don't think I'll tell him myself. There's not time, you see.

Mary, you know that ship carving you've always liked so much? It's yours now. And Jamie, I know you've taken up smoking lately, and I want you to have that rack of pipes you've always admired.

So why don't you kids take them now and then go do your homework? Grandpa's going out for a nice long walk. ■

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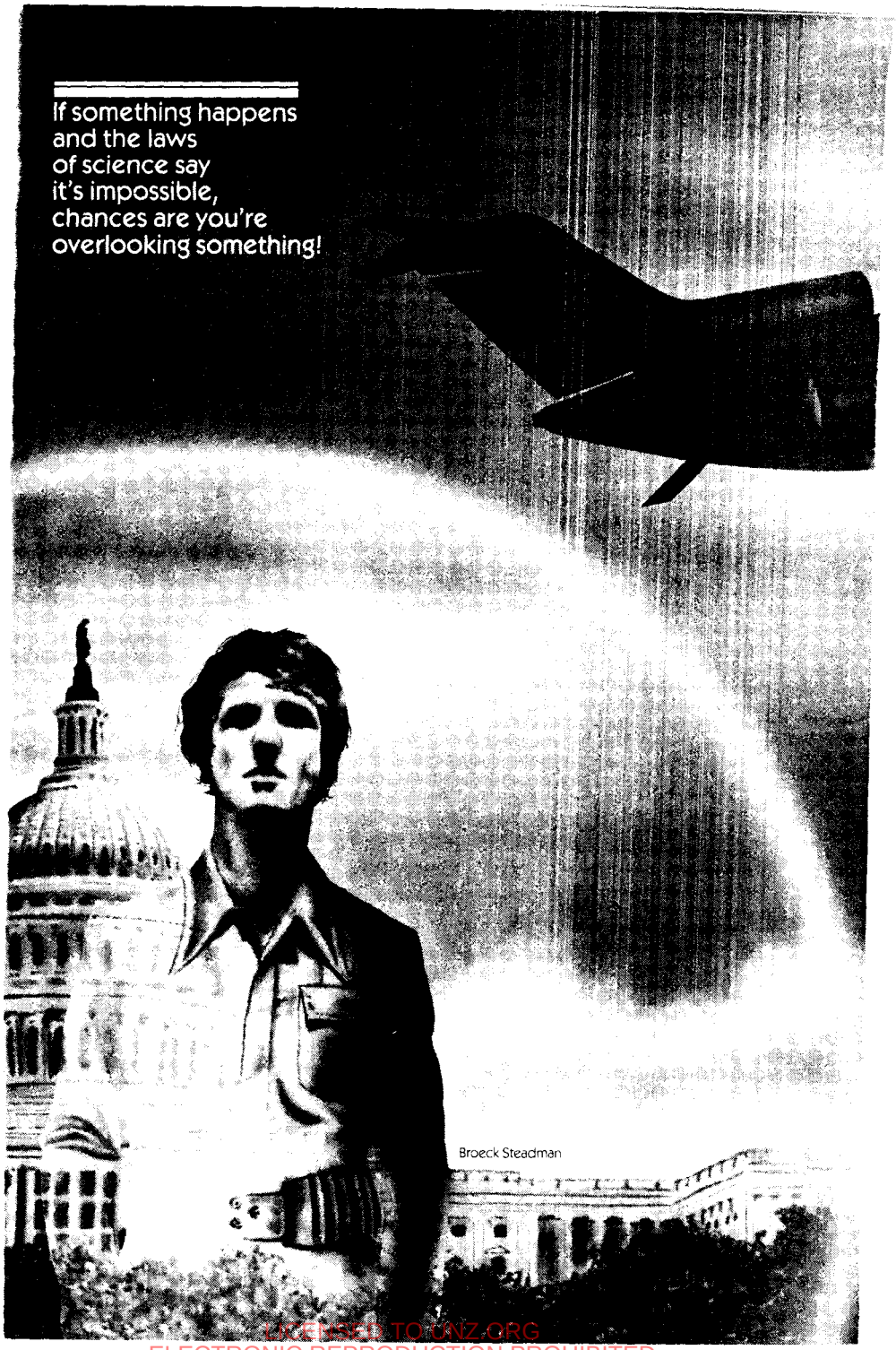

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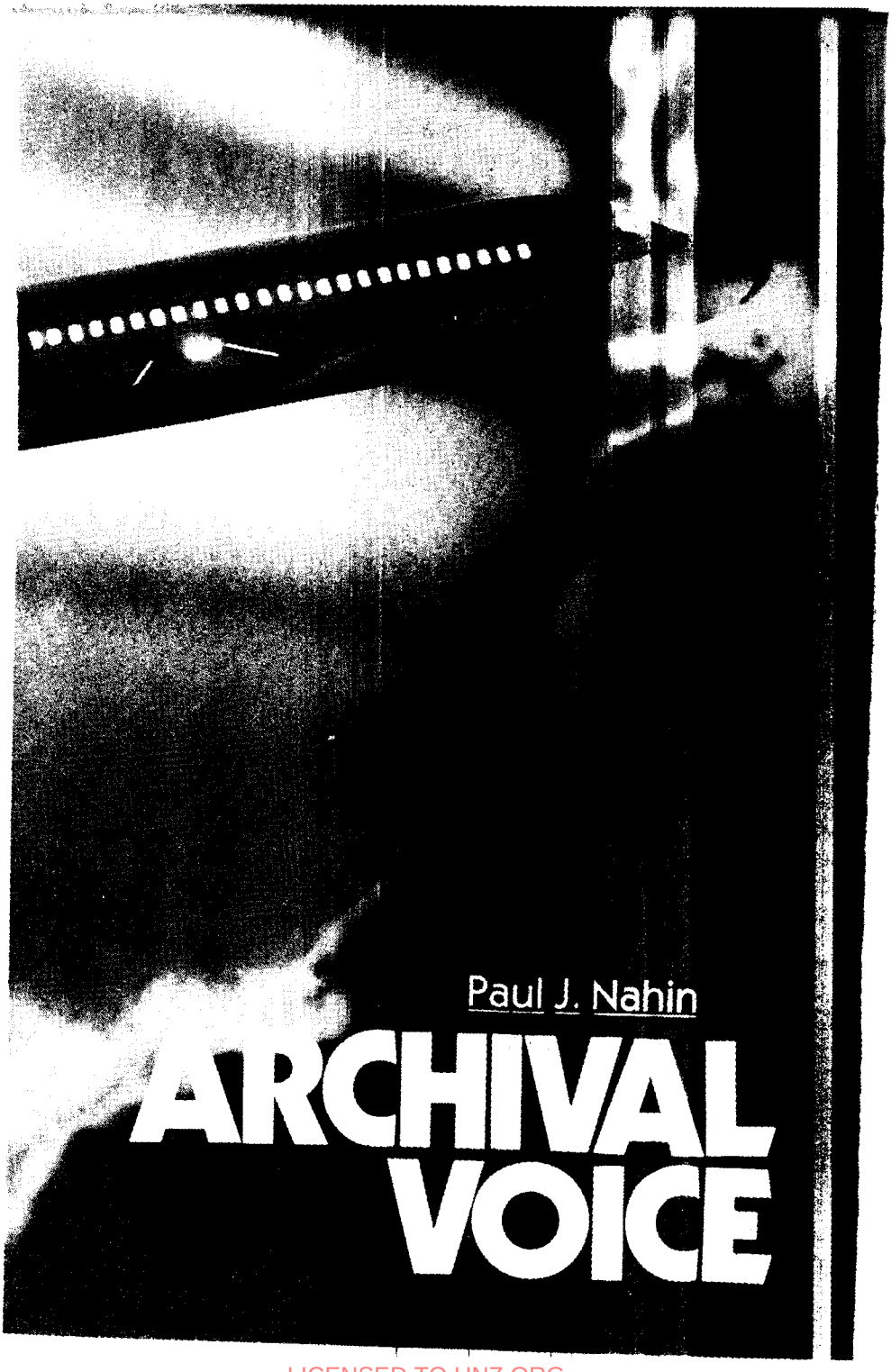

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The Time: November 24, 1971, 7:49 P.M. [PST]
The Place: Somewhere over the Cascade Mountains of southern Washington

The beleaguered jet flew through the swirling snowstorm, its flight crew struggling desperately to keep the battered aircraft level. Sightless due to ice an inch thick on the windshield, wipers frozen to the glass, they trusted their fate to the lights, gauges, and radar scope that provided the only illumination in the cockpit.

The circular sweep of the weather radar beam showed a solid mass of intense storm energy all around the machine and so the men ignored it. They kept it turned on, though; in spite of its uselessness the steady rotation of the beam was a psychological comfort, and Lord knew they could use a bit of that. The madman in the rear of the plane would probably end up killing them all.

Suddenly the captain cursed aloud, his voice filled with helpless rage. His eyes were fixed on the steady red glow of a panel lamp that had just flicked on. "Jesus Christ, the bastard's lowering the rear ramp!"

The flight attendant, locked in the cockpit only minutes before, said nothing. She was too well trained to succumb to hysterics, but the knuckles of her hands were white with the tension of her grip on the emergency jump seat. Dear God, but she didn't want to die.

The Time: March 17, 1987, 11:07 A.M. [EST]
The Place: The Blackworld floor, CIA sub-basement security vault, Langley, Virginia

The deputy director for technical analysis, Blackworld studies division, sat at a table inside the mesh-lined, air-conditioned room thirty-five feet beneath the deepest roots of the trees that surround CIA headquarters. This is where studies so sensitive they would never see the light of day were kept—in the Blackworld.

The DD watched the guard—a large man armed with a nasty-looking, large-caliber automatic pistol on his right hip—spin the lock on the document safe with practiced skill. The man extracted the HB transcript, brought it to the table, and silently waited as the DD signed the possession card. The guard took the card and then walked smartly into the corridor, sliding the door shut as he left. It locked with a gentle, firm click.

"Push the buzzer on the table, sir, when you're finished," he said through the door mesh. Without waiting for a reply he walked away down the corridor, his heavy boots echoing in the hall.

There was no need for the guard to stay and watch the DD, as three hidden closed-circuit color TV cameras kept constant watch over every cubic centimeter of space in the vault. What they saw was simultaneously displayed on monitors in the guard station at the end of the corridor, and temporarily stored on remote magnetic video tape recorders. No one really thought the DD would surreptitiously try to microfilm the report, but security was routinely tight for everybody. The president of the United States would be treated no differently.

The DD reached inside his coat pocket and extracted a handwritten note. Could the HB tape really be as important as the destruction of the M-1 NATO tank?

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The mystery of how the tank had been blasted out of nowhere, torn open like a gutted fish by super-heavy depleted uranium shell-fire in the middle of West Germany, had been the DD's assignment. He'd been in on the top secret study for more than six weeks now, and essentially nothing had been accomplished. The pressure was on, and the DD resented anything that distracted his attention. This sudden change in his schedule had better be worth it.

But Henderson had written the note, and Henderson was top-flight. The DD had never known the senior analyst to be wrong. If Henderson thought there was something the DD should see right away, then there *must* be. The DD read the note again.

Allen,

I've transcribed the HB tape myself; not even my own staff has heard it. We're damn lucky it was addressed to the president or it might well have been leaked. Something like this, if it should go public, would bring all the UFO nuts out in full strength. And I can only shudder at how Pentagon hawks could use this to "explain" the M-1 tank ambush. Lucky for us, too, it was Professor Matthew, one of our free-lance scholars, who discovered it misfiled in the Hitler Bunker file over at the National Archives. Matthew is an historian and wouldn't know a photon from a phonograph even if he did try to listen to the tape (which for technical reasons I doubt he could have).

The audio quality is pretty awful—the recording level must have been low to start, and the oxide coating on the tape has been rather badly damaged. Probably due to the casual tossing around it got in its years over at the NA. Still, using some of the nice gadgetry you've kindly let me buy for the lab these past few years, I've managed to make out very nearly all of it.

I have lightly edited the transcript into a form suitable for immediate reading by the Director. Where I thought it would be helpful I've added commentary in the form of "Analyst's Notes." Our friend starts his message immediately with lots of ranting and raving. Later on, he calms down. I'd venture he's an unstable person, at the least, but Jacobs in the psycho-personality section can no doubt provide you with insight on that score.

My formal evaluation and recommendations are at the end of the transcript. Call me if there is anything more I can do.

Gordon H.

The DD replaced the astounding note in his coat pocket and turned his attention to the report on the table. It was thin, only a few pages thick, with a heavy white cover. It was tersely labled TRANSCRIPT OF THE HB TAPE, and carried the routine security legend "Eyes Only" above the Agency's imprint. He vaguely recalled the tape's discovery being discussed at the last directors' meeting, but at that time it hadn't been processed. The DD fished a slightly bent cigarette out of his shirt pocket, lit up, and opened the report. He shook off the childish feeling somebody was behind him, peering over his shoulder—the damned, eerie room with its hidden TV cameras gave him the creeps—and began to read.

D.B. Cooper is a skunk, a rotten, no-

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account thief! We were going to split the two hundred grand right down the middle. His half because he was taking all the chances. My half because it was my brain that made the job possible. But he left me high and dry! Took it all and ran.

I'm telling you this because I want the case reopened. The FBI has given up, you know. Not officially, but they aren't *ever* going to catch him without help. Once you hear old D.B. is still alive, and how he did it, I hope you'll track him down and throw his butt in jail for fifty years. Here's how it happened.

Up until last year I was working as an electronics technician for a Boeing subcontractor in Seattle. I didn't work on any of the mechanical design of the 727, but I hung around with the fly-boy engineers who did, so I learned a lot. Enough for the job, anyhow.

[Analyst's Note: It was a Northwest Airlines 727 that D.B. Cooper hijacked on Thanksgiving eve, November 24, 1971.]

My specialty is analog circuit design, and if I say so myself I'm damn good at it. I never graduated from college, but I took all the math and electrical engineering courses I could get. Got A's in all of 'em, too. It was the university requirements in the non-technical stuff that did me in—I flunked History of Western Civilization *three* times, and I think that set a school record.

Anyway, I got into trouble with my supervisor because I was fooling around on company time with old Wallingsford's equations. Now, don't go running to the library because you won't find "Wallingsford" in the index of any book. Huntington Wallingsford was a retired scientist who stayed at my university as a visiting lecturer in physics the year before they booted me out on academic suspension. That was two years before I met D.B.

[Analyst's Note: Professor Wallingsford is still a mystery, but we have been able to unearth one bit of intriguing information about him. He was, in the early 1940's, a civilian English scientist associated with a classified Navy project. The project was cancelled when a destroyer combatant, the USS *Eldridge*, carrying top secret electronic gear while on loan to the project, mysteriously vanished at sea and was never recovered.]

Everybody else there thought the old coot was sorta eccentric, but I kind of liked him. I could see the old guy was really sharp, even if the others didn't. I made it a point to talk to him when I had the time, and he seemed to appreciate the attention. One day he showed me how much.

"Mr. [name missing]," he said to me. "I'm going to show you something you won't believe! Come into my office, please."

I followed him in and watched as he unlocked a file cabinet and pulled out the dirtiest, oldest-looking notebook I've ever seen.

"Here it is, my boy," he said, "my *life's* work. I've spent thirty years on my equations, and I've finally solved them! Here, look at them, look here!"

The old geezer looked like he was about to pop a gasket, so I looked. There was page after page of the neatest handwriting I ever saw. At first I sorta understood it. It started off with a non-linear traveling wave equation, and then there

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were Maxwell's equations for the electromagnetic field, and one or two other things that seemed familiar. Then he combined them somehow into really complex-looking stuff and after that I was lost.

All the while I was looking at his work old Wallingsford just stared at me. When I looked up he asked, "Well, what do you think? Can you build it?"

"Build it?" I said, "build what?—I don't even know what the hell this stuff *is*!"

He looked surprised at first, and then smiled. "No, no, of course you wouldn't; how could I be so stupid? It has taken me thirty years to figure it out, so how could you understand in a mere few minutes. But you *will*—soon!"

And you know, he was right! Over the next three, maybe four months, I met with him in his office after classes and we'd go over the math. What old Wallingsford had was the theory for what he called a "photon duct," a gadget for changing the trajectories of photons of any frequency, including those of visible light.

[Analyst's Note: Our friend offers no technical information concerning the details of his machine. Suffice it to say his claim is at best *improbably possible*, and we must emphasize we can offer no explanation ourselves as to how it might be done. However, as Maxwell showed a century ago, light is just a particular form of electromagnetism, and so, assuming a "photon duct" is even possible, then it is plausible it would be electronic in nature.]

The only hang-up was, while Wallingsford was good with pencil and paper, he was the original klutz in the lab. He could just walk into a lab and something would break, burn out, or melt. He needed somebody with the golden touch with electronic circuits, and he'd heard of my reputation in that department. Yeah, why be modest—old Wallingsford needed *me!*

Once I understood the math, I tried to build the circuits. Man, *how* I tried. And no dice. I just couldn't get them to work. Wallingsford would come into the lab and hover around, offering suggestions, twiddling knobs, and busting things. Sometimes he'd mutter stuff like "It *must* work. It somehow worked on the held ridge. It should work now!" When I asked what he was talking about, and what the "held ridge" was, he shut right up. Said he'd tell me "the whole story" when the time was right, but he never did.

We worked on it for months. The worst of it was it *should* have worked. There were some pretty weird circuits, but it *should* have worked. We were putting a lot of electrical energy into the power circuits and it was going *somewhere*, but the thing didn't get *hot*. And no energy was radiated. But nothing *happened*, either. We had *something*, but we couldn't figure out *what!*

Well, that's the way things went the whole year. Then I got suspended and Wallingsford retired for good and dropped dead of a heart attack three months later. All I had was the notebook and a pile of electronics that ate electricity. Still had to eat, though, so I got the job in Seattle.

But I didn't give up. When I get my teeth into an electronics problem I don't give up. Now maybe it wasn't really proper to use company time, and the

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company electronics lab, or the parts bin in the lab, but the problem was like an addiction. I *had* to work on it.

So that's the way it went for *another* no-luck year. Then one day, when even I was ready to throw the thing in the trash, I tried something in the equations that neither Wallingsford or I had done before. By then I was willing to try *anything*. I went through the equations, and everywhere there was a square root I used the *negative root, not the positive one*. When I got done I had a new machine, but it was weird because only a few circuits got changed and even then only just a bit. But that was all it took.

I turned it on, and I swear—the sucker disappeared! You could reach in with your hands (and watch 'em vanish right up to your wrists), and you could *feel* the hardware. There was sort of a bubble around the thing. It was an invisibility cloak!

[Analyst's Note: The term "cloak" is most appropriate. However the device might function, assuming it can even be built, the net effect would be that of what would be called a "spherically symmetric surface mirror." That is, a ray of light impinging on the "bubble" must not be reflected, but rather caused to skim along over the surface and to depart from it at the exact point the ray would have reached (and at the appropriate angle, of course) had the ray traveled along a straight line. To an external observer, it would be just as though the ray *had* traveled in a straight line, with no detour. How this astonishing effect might be accomplished, of course, we have absolutely no idea. But there are two other effects that logically follow from the premise that such a device exists. We mention one now, and leave the other for later. Both seem to be fatal flaws. The first is rather subtle. All energy radiated *inside* the bubble must *remain* inside, or else it would be detectable. This means a human body inside such a bubble, with its energetic metabolic processes, must cause the interior temperature to rise. To remain inside such a bubble would soon become intolerable, just as would wearing a heavy winter coat on a warm summer day. A "cloak" it would be, indeed.]

So picture it, will ya. There I was, my fingers caressing this invisible pile of electronics, with my hands missing, and all the months of frustration over. I just let out the biggest war whoop you ever did hear. And in walks my shift supervisor.

He was so ticked off he didn't notice my hands were gone. I quickly stood up with my body between him and the photon duct and flipped the power off. The duct—and my hands—snapped back into view. I was lucky—he didn't see a thing.

To make a long story short, all my freebie work had finally caught up to me and I got canned. I was told to clean out my stuff by the end of the day.

I couldn't take the photon duct out past the plant guards, but that was okay. I had the wiring diagrams burned into my brain. I ripped apart the unit on my bench, right down to the transistors, so nobody would accidentally stumble onto what it could do. I lost my security clearance too, but I didn't care. I guess I should have, considering all the trouble that's happened since.

Anyway, even though I was nearly broke I went out and got loaded, just

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to celebrate. My only regret was that old Wallingsford wasn't around to tie one on with me. It was at the bar I met D.B.

We got to talking and drinking, or maybe I should say *I* did, and D.B. mostly listened. By the time the bar closed early next morning D.B. had heard all about the photon duct. I don't *recall* telling him, but that afternoon, after I'd forgotten all about it, I got a call from him. He was willing to foot the bill for a new duct, but he wanted something in return. If I was interested, I should meet him back at the bar.

Well, I *really did* want to build another photon duct. I went back to the bar and D.B. laid it all out for me. He'd put up the cash I needed to build a miniaturized duct—about two grand—*if* I helped him with his plan. Which of course, as you well know, was the hijacking of an airplane.

[Analyst's Note: On November 24, 1971, Northwest Airlines flight 305 was boarded in Portland, Oregon by a man calling himself D.B. Cooper. The B-727 took off for its last stop—Seattle, Washington—with a crew of six and thirty-six passengers. Minutes later Cooper gave one of the flight attendants a note demanding a skydiving sport parachute and ten thousand twenty-dollar bills—or he would blow the plane up. To lend credibility to his threat the man displayed a briefcase containing two large red cylinders and a great deal of wire. The plane landed at the Seattle-Tacoma International Airport, the authorities met Cooper's demands, and the plane took off again. Now on board were just one flight attendant, Cooper, and a cockpit crew of four. Three Air Force jets followed in pursuit, but lost the plane in a snowstorm. After being told the plane had insufficient fuel to reach Mexico, Cooper had the plane headed for Portland at an altitude not to exceed 10,000 feet and at a speed of 200 mph. He then locked the flight attendant in the cockpit with the crew. At 7:50 P.M. a control panel light signaled the plane's rear boarding ramp was unlatched. At 8:10 P.M. a second light indicated the ramp was fully extended. At that time the plane was over the Cascade Mountains of southern Washington, near Lake Merwin. The outside air temperature was seven degrees below zero. The wind chill factor, of course, was considerably lower. Hours later the plane landed at Reno, Nevada. D.B. Cooper and the money were gone. A massive, four-state search failed to discover a trace of either. No chute in a tree, no body in an impact crater, no money. Absolutely *nothing* was *ever* found, with the exception of a small amount of rotted cash years later.]

I'm not making any excuses. I knew it was a crime. But the way D.B. explained it, no one was going to get hurt. He wouldn't have any sort of weapon on him, and no explosives. It was going to be a very "low-key" job. That's why he only asked for two hundred grand, instead of ten million bucks! We charged only what we felt the market would bear without it getting desperate and pulling guns.

But I was dumb, too. I should have seen D.B. wasn't going to be happy with just that one job. So once he got off the plane, why, he just kept on going and took *all* the money *and* my photon duct!

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[Analyst's Note: The briefcase the authorities believed to be a bomb might have been the photon duct machine. The two large, red cylinders, made to look like explosives, might have been powerful lead-acid batteries to serve as a portable power source. We emphasize the speculative nature of these "might have beens."]

Got the picture now? See why the cops could never find any trace of D.B. after he jumped out? Sure, it's because he *never jumped!* Once the plane landed, and before the FBI busted in to free the crew, D.B. turned the duct on and made himself and the money invisible.

D.B. lowered the tail boarding ramp—that's one of the things I learned about the 727 while working in Seattle, that it could fly with the ramp extended—just to set up a red herring. He was supposed to throw a small bundle of money out on the chance it would be found and everybody would figure he'd been killed in the jump. It hasn't been found yet, but it's out there.

Before the initial confusion died down, the bum just walked out of the plane, right down the ramp, and past the cops! He got away clean! Take a look at the record since then and you'll find a lot of heists over the years that could only have been pulled by an invisible man. It was D.B., *for sure*, every time.

[Analyst's Note: We *have* conducted an extensive computer search of the historical crime records. Our friend is correct in that there have been crimes easy to explain by postulating an invisible criminal. But of course there could be other explanations, too, not requiring such an extreme assumption. The description of Cooper casually striding off the plane brings us now to the second fatal objection to the possibility of a photon duct device. Just as no internal energy can escape the bubble, then no external light can penetrate it. Indeed, this is the *whole idea* underlying the concept of the "photon duct." But of course if no light can enter the bubble, then how could D.B. Cooper see? In fact, anybody inside such a bubble would be *in the dark*, totally blind!]

So there I was, fat, dumb, and shafted. I couldn't go to the cops and tell 'em what had happened. They'd have tossed me in the slammer along with D.B., if they ever caught him. I couldn't even go to the military brass and beg for forgiveness. It *is* a nutty-sounding idea, I'll admit that; and without a working model to demonstrate right away, they'd have kicked me out on my fanny. Once they saw I'd had my clearance pulled for goofing off on the job, they probably would have turned me over to the cops as a crazy.

And anyway, I ain't giving the duct away for free.

Old D.B. has really done a number on me. I *want* that guy! Help me nail the bastard, and maybe we can work a deal on the duct. I'm not much on politics, but if everything else is equal I'll talk with you guys instead of the Russians. Otherwise—.

[Analyst's Note: At this point there followed a rambling sequence of instructions on how to make initial contact. The idea seems to have been for the president to have placed coded items in the personal sections of various daily publications on certain specified dates.]

END OF TRANSCRIPT

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* * *

The DD leaned back in his chair, took off his glasses, and rubbed his eyes hard with his knuckles. Was this the start of a new silly season, he wondered. That time of the year when all sorts of weirdos and kooks surface with their deranged theories explaining the secrets of the universe? God, what utter nonsense this HB file is!

The DD felt a momentary flash of anger at Henderson for the time lost from the tank study to read this dribble out of some fool's unbalanced mind. But no, Henderson was right. This sort of inflammatory, outrageous crap was dangerous precisely *because* of its potential appeal to the more hysterical elements.

The DD snuffed out his third, stale cigarette since he'd entered the vault. He made a face as he smashed it in the ash tray—the damn thing had made the vault smell like one of the brands out of eastern Europe made from camel dung.

The DD pushed the buzzer for the guard, and while he waited to be released quickly scanned through Henderson's final summary page. It was consistent with the tone of the Analyst's Notes throughout the transcript. D.B. Cooper was dead, a decomposed corpse lost in a mountainous wilderness; the tape was a fraud; the photon duct was rubbish; the whole business should be sealed off and forgotten. The DD agreed without reservation, slapped the report shut, and stood up just as the guard arrived.

The man entered carrying a small aluminum box with a meter in it. The meter needle was pulsing. "Do you have any electronic devices on you, sir," asked the guard, "anything like a transistor radio, a digital watch, a paging beeper, or a hearing aid?"

"No," replied the DD, startled by the strange question. "Why do you ask?"

"At the same time you entered the vault we began to pick up some kind of regular interference on the monitor screens in the surveillance room. A periodic, static-like burst in the picture. We thought there might be a malfunctioning piece of electronics on you that could be radiating into the TV pick-ups here in the vault. This box will let me do a quick body scan, and if it is something like that then we won't have to rip into the camera system."

"Be my guest," quipped the DD, who spread his feet wide and held his arms up over his head. "Scan away."

The guard slowly moved the box along the DD's legs, upper body, and arms. The needle continued to pulse rhythmically, but no more than it did when the guard held it anyplace else in the vault. "Well, the problem must be in the TV system, itself," said the guard. "Sorry to have held you up, sir."

The DD waved the guard's apology aside with another smile and left the vault.

Later that afternoon the DD sat in his office looking at photo enlargements of the shot-up M-1 tank. He'd hoped for inspiration but none had come. The entire affair was as deep a mystery as ever. When the telephone buzzed it was a welcome break from his frustration. His secretary informed him it was Henderson.

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"Yes, Gordon, how are you?"

"We're in trouble, Allen. Big trouble." The analyst's voice sounded strange to the DD—strained, nervous. A voice totally out of the ordinary for the normally calm scientist. "Can you come to my office—right now? It's urgent!"

The DD was a man sensitive to the projected emotions of others. Henderson was on the verge of panic. "Yes, of course. I'm on my way."

Henderson intercepted the DD in the corridor and almost pulled him into the inner office. The DD noticed Henderson was sweating, and his hands were trembling. Fascinated by the out-of-character behavior, the DD watched as the analyst practically yelled at his secretary, "No interruptions, no calls. None!" and locked the door.

Henderson faced the DD and said, "I know you've read the HB file."

The DD nodded and replied "I agree with your assessment completely. At best it was a smart-aleck college prank. At worst it could cause a lot of trouble. It's locked up for good." Henderson was shaking his head vigorously.

"No, I was *wrong*, Allen, wrong! Do you understand what I'm saying? My God, our most secret facilities are *wide open!* Of course, now you've got the answer to the tank puzzle."

The DD stared at Henderson in amazement. The man was making absolutely no sense. "What the hell are you talking about? You, yourself, gave good, solid technical reasons why this so-called photon duct is bunk."

"Allen, I neglected to make the most obvious check, an *easy* check, on the credibility of the transcript. I didn't check the newspapers for the days when our boy wanted to see the president's reply printed—because obviously there'd be none."

Henderson sat down behind his desk and looked up at the DD. "Well, after lunch I asked the microfilm librarian to

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pull the personal sections for those days in the two papers we carry that were on the list. There *were* coded replies in them, just slightly different from the code for *our* side. The bastard must have sent the other side a tape, too. And they *did* answer."

"Oh, come on, Gordon," said the DD, brushing away the analyst's concern, "that's just the kind of nice little detail you'd *expect* out of a clever prankster."

Henderson stood up and began to pace back and forth. "Look," he said, "I got a call from the Blackworld security guards after you left the vault this morning. They told me about the monitor interference. They also told me it stopped right after you left."

The DD felt the first touch of concern. "What are you thinking—that the other side has somehow planted a bug on me?" The DD glanced down at his shoes nervously. Was he a walking transmitter?

"That's what I thought, too," replied Henderson. "So I got hold of the magtape that was running during the time you were in the vault. The guards said the interference was periodic, and I figured I might be able to get some timing data from the tape. That might help in figuring out what kind of bug we're dealing with."

"And?" The DD was positive now that Henderson was working up to something a lot worse than some simple bug.

"Look at this," said Henderson, leading the DD over to a table. A TV monitor and a tape playback machine were on it, a tape already threaded in the machine. "This is the tape of you in the vault. When I ran it through the first time I could see nothing of interest except for the burst interference. It was at far too low a frequency for a malfunctioning bug. So I slowed the tape way down, and synched the monitor display circuits to the interference itself. That stuff is caused by electronic switching, all right. The pulse rate is low, but each pulse is very short in duration. That makes it too fast for the eye to see. My God, it's so obvious, and I missed it!"

"Christ, Gordon, *what* are you talking about?"

Henderson's voice went flat with resignation. "I told you the photon duct was baloney because it would be hot and dark inside the bubble, right? Well, what do you do when a coat is too hot? You unbutton it. What do you do when a room is too dark to see in? You open a window. Watch this." He turned the recorder on, and the tape reels began to turn at a very slow speed.

The DD, horrified, watched himself in the vault, reading the HB transcript while smoking what he'd thought was a too-old cigarette. And right behind him, snapping in and out of view in the slow-motion picture, stood a man. A man wearing an odd-looking, bulky belt around his waist. The man, his hard, Slavic face intense with concentration, was reading the report over the DD's shoulder.

The man, who was smoking a cigarette wrapped in the distinctive red and black paper of one of the more awful brands from the Ukraine, seemed to be smiling, almost on the verge of laughter. The DD understood why. ■

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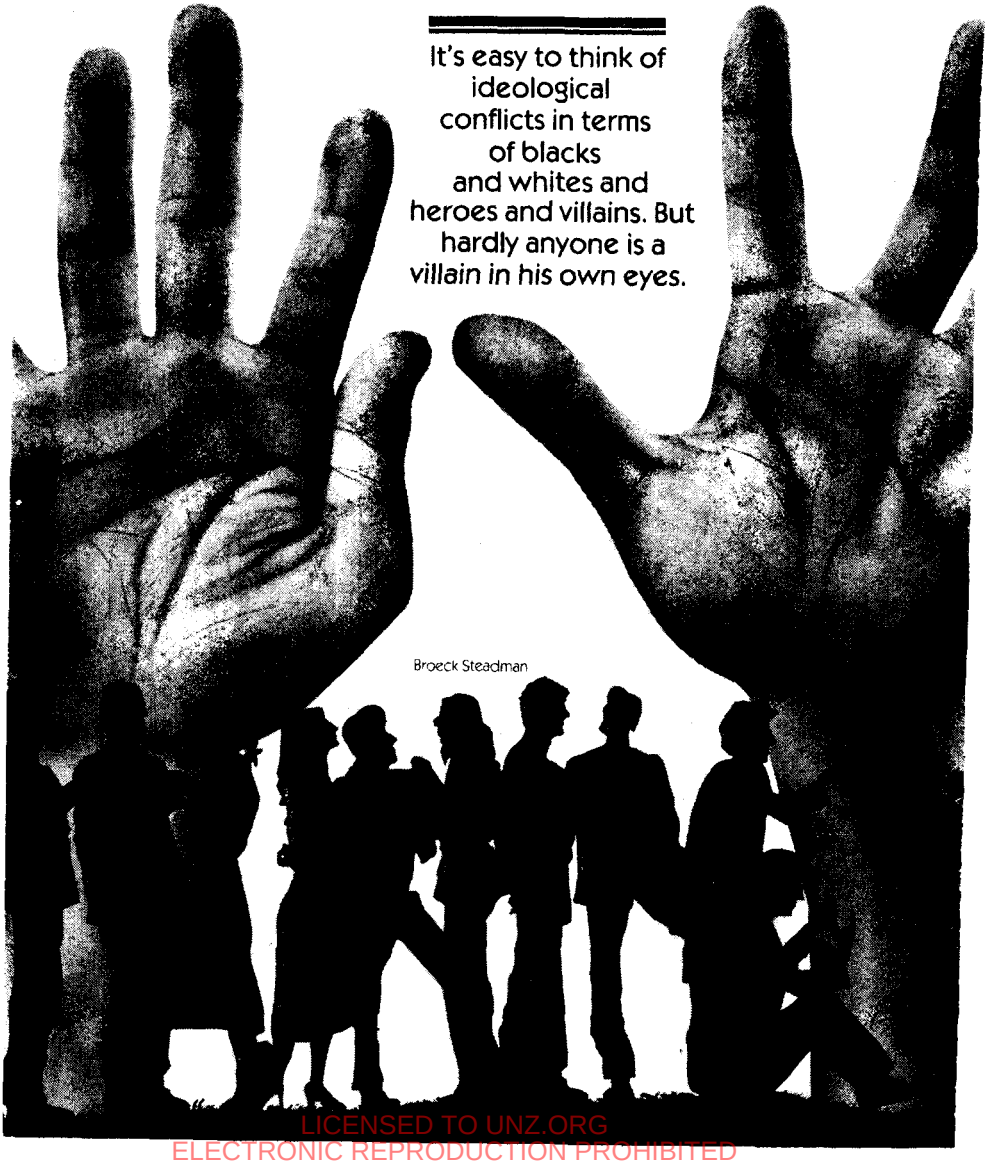
MENACE

It's easy to think of ideological conflicts in terms of blacks and whites and heroes and villains. But hardly anyone is a villain in his own eyes.



Broeck Steadman

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"Through here, Director."

Merritt Thackery nodded, pushing past the pale-faced Operations aide and into the suite. *So young*, he thought. *They're all so bloody young—and so damned deferential.*

The lights came up automatically as they entered. Thackery heard the faint whir of an environmental unit for a moment, until it was masked by the calming tones of cetamusic. He took in the room at a glance.

"Two work stations?" Thackery asked, raising an eyebrow.

"If you need more—"

"I hardly see what I need with two."

"This room is for your staff, sir. Administrative assistant and database librarian. Your office is on ahead, through that doorway."

The doors were deep-grained wood—a frill still rare on-orbit, since pressure seals were more important than esthetics. Thackery stepped forward, and the doors swept back noiselessly as though under a butler's hand. Again the E-computer acknowledged his presence with light, barely audible sound, and the smell of a forest.

It was not Thackery's office, and yet it was. The transition team had shelved his books, and found a place for all his memorabilia: a memento from each of the forty planets he had visited for the Planetary Survey Service. He ran his fingers over the black surface of the fertility icon from Gnivi, realizing as he did that he had brought nothing back with him from Rena.

Except a bellyful of bile, he thought harshly. *No matter. If only I could forget that place completely.*

Michael P. Kube-McDowell

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"Satisfactory, sir? There's a rest and hygiene center through there," the aide said, pointing, "and your station is voice, video, and Kline capable to all points in the Service net, with full clearance to all files, of course."

Thackery grunted. "And do you have bodies to fill those stations out there?"

"We took the liberty of selecting a staff, subject to your approval, of course. We can have them here whenever you decide to resume your position—"

"I'm resuming it now. Have them here within the hour."

"Sir—that may not be possible," the aide said uncomfortably. "We assumed that you would be going downwell to Earth. Benamira is beautiful right now, and Lodge Lucretius has been readied for you."

Thackery thought longingly about Benamira, the private Service enclave in New Zealand, and about the centuries-old complex where he had resynchronized after his last dozen missions. Then he put the thought away.

"No. I'll be staying here. See about my staff."

The aide lingered. "Director—if I could speak personally—"

Thackery raised a hand in grudging assent.

"Director, you left here for Rena before I was born—before most of us were born. But everyone here knows about you, about what you've done for the Service," the aide said earnestly.

"Studied me in school, no doubt," Thackery said tersely.

The aide nodded and smiled eagerly. "I must have read the story of how you tracked down the D'shanna a dozen times. I would be delighted if there were ever anything I could do for you—"

"You can get me my staff," Thackery said, firmly but not unkindly.

The aide lowered his head, chastened. "Right away, sir," he said, and hastened from the room.

Thackery sighed, long and expressively.

The least they could have done is put me in my old office, he thought as he moved to sit down. Though the filters kept the room dust-free, it seemed to him more a museum than a place that he could work. *As if putting an old fossil on display,* he thought. *Well, this fossil has a bit of life in it yet. And one more job to do.*

From the personnel files, Thackery learned he had become titular director during the twenty-year jump back from Rena. To find out who had been exercising the power in his absence, he turned to the Command Directory.

The answer was there, but only for a practiced eye. Relativistic travel played hell with organizational charts. Top staffers would flit to an Advance Base in order to see a long-term project at fruition on their return, or to accumulate Experience Promotions, or just for the illusory extension of their lifetimes.

Thackery found the Command Directory full of unfamiliar names. He looked in vain for Krig Staayune, of the Journa colony, whom Thackery had hoped would succeed him. But Krig had stayed on-station and was dead, as were most of those Thackery had worked with. Dead or, in a few cases, retired to Benamira.

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Thackery shook his head. After 400 years and 40 planets, the loss of old friends was no surprise. In fact, he had come to mourn them in advance, at departure. Or was friends the word? Had he let anyone get close after the first few times?

Atlee. Diane Atlee. That name was familiar. He recalled a tough-minded cadet. Now she was Associate Director of Operations, in Krig's offices, with everyone above her "ON LEAVE" or "ON ASSIGNMENT."

Except, now, Thackery himself.

The base library system had been overhauled twice in his absence, and altered to the point where Thackery wondered if he had ever known how to access it efficiently. Having once prided himself in his skill with the Service data base, he rebelled at the system's patient prompts and corrections. Putting the station on stand-by, he went to the greatport while awaiting word on his staff.

A touch on the opaquing controls, and "The Garden of Earthly Delights" dissolved into a panorama that he had first seen 420 years ago: a great and still-growing orbiting city against the backdrop of a gibbous Earth. A half-degree ahead of them in Clarke orbit was a brilliant star—the yards, where the skeletons of three great warships and assorted minor craft were taking shape.

I never should have left here that last time, he thought. *If I'd stayed, I could have died quietly and at peace, like Krig. If I'd never seen Rena, I could have let go and left things to other, younger hearts. But this is something no one else can do.*

There was a noise behind him, and Thackery turned away from the port. A pert young woman wearing Support colors stood in the doorway.

"I'm Cathleen Bern, data librarian," she said brightly.

Thackery nodded, a spare effort at sociability. "I want you to track down some people for me."

Bern smiled encouragingly and bobbed her head. In the emotional sterility of a training center somewhere, she had studied the psychological profile of returnees, and so thought she understood them. "Some old friends, sir?"

"No," Thackery said curtly. To himself he added, *some new enemies.*

"Look at where you are! Look at where you've been! Think the thoughts that you don't dare voice because you've learned not to dream. And ask yourself: What could you be if you were free?"

The speaker's face was marked by his intensity and faintly flushed. He held his commanding gaze for a long moment, staring outward into the darkness around him. Then his features relaxed, and he sat back on the stool behind him. Though he held his lean frame erect, there was a roundness about the shoulders that betrayed his fatigue.

"All right, Eric," boomed a new voice. "It's clean and complete. Want a playback?"

"Not tonight," said Eric Lange. The lights came up as he descended from the podium and walked to the exit.

Waiting in the hallway outside was a petite woman with a shock of jet-black hair. "Good show tonight," Tenaeo Lange said, kissing his cheek and finding his hand with her own.

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Lange nodded. "But is anyone listening?"

"I picked up the ratings."

"And?"

"Mixed. Subscriptions aren't up enough to bring us any royalties, or down enough for us to owe a subsidy fee."

"So no work for the accountants."

"For the fifth month in a row."

"I know," he said with a discouraged sigh.

They had made their way outside the studio, and turned down the walk towards the Sprint station. Though it was after 10 P.M., there was more than enough light from the mirror satellites, hanging overhead in Clarke orbit like hexagonal moons, to banish the darkness within the 100-kilometer-wide Pôrto Alegre Light Zone.

"Maybe I've peaked," Lange said presently. "Maybe that's all the people we can reach by subscription video. Maybe that's all the people who agree with me."

"With us," she amended. "I don't want to believe that."

"Reality's not obligated to conform to what we want to believe."

"You're cheerful tonight."

"I'm tired tonight." They walked a time in silence, while the sounds of the Sprint cars arriving and leaving grew louder.

"It might be two hundred million instead of twenty million subscribers, for all the difference it seems to make," Lange said at last. "They only listen so that they can convince themselves that they're better than everyone else. They want an elitist feeling but not the responsibility to lead that goes with being one of the brightest and best."

Tenaeo took her time composing an answer. In that interval they reached the station, and Lange signaled for a Sprint from the nearby accumulator. When they were settled in the front-facing seat of the cozy commuter vehicle, Tenaeo told it their destination and turned to Lange.

"I told you I'd support you in this as long as you thought it was worthwhile. Do you want to quit?"

Lange's "no" was quick but far from emphatic.

"Then do you want my help?" She smiled. "Remember, free advice is worth what you pay for it."

"I'm stagnated on my own. If you've got suggestions—"

"I'll remind you you said that. Here's your first problem: watching 'Night Thoughts' is a solitary activity. While you feel like the only voice in the wilderness, your viewers probably feel like they're the only person in earshot. It's not the kind of thing they have on in video rooms or rec spots where they get reinforced by group dynamics."

"No," Lange admitted.

"Second problem: years of conditioning. The party line says self-glory is destructive, that our ambitions should be for the greater group and not for ourselves. You're asking a lot to expect people propagandized from birth to mediocrity to suddenly step forward and demand recognition."

Lange said nothing, his usual way of acknowledging when she was right.

"What you need to do is provide them an easy step toward activism," she

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said breathlessly. "Tonight you talked about how the team player gets rewarded while the innovator gets ignored. If we've seen it, so have they. Invite them to share their stories. Then use the stories on 'Night Thoughts.' One good anecdote is worth a showful of generalities."

"Add a personal dimension," Lange said slowly.

"And in the meantime, hone your message into memorable units. You don't have to descend to sloganeering, but you have to be concrete. You have to crystallize not only your dissent but theirs. I think tonight's show was a start."

Lange hesitated. "Do you really think they're out there?"

"In a planetary population of nine billion? Of course they're there."

"How can you be so sure we're not tapped out?"

She looked out the window into the deepening darkness, as the Sprint left the Pôrto Alegre zone and its perpetual light. "Because those who despise you haven't started to resist us yet," she said soberly. "When they begin to take notice, our quiet little lives will be a fading memory."

"I thought we should meet and talk," said Diane Atlee, folding her long-fingered hands in her lap. She sat on the sculptured divan which faced Thackery's great-port. "We need an understanding."

Thackery grunted. "Then understand this: keep doing what you've been doing and leave me be, and we'll have no problems."

"Then you don't want day-to-day oversight?"

"I don't even want month-to-month oversight. I'm occupied with my own concerns, and I don't want or need the distractions."

Atlee relaxed visibly. "Do as you choose, then, within the limits of Service regs—without interference. But I do need to know what it is you're doing. Your library searches have monopolized system researchers more thoroughly than any project the managers can remember. What's up?"

"Surely the library managers included that in their complaint," Thackery said brusquely.

"I know the *what*—searches of immigration records, ship arrivals, passenger lists, birth records, any kind of citizen files. I don't know *why*."

Thackery was mute, his lips a white line.

"You've been away a long time," Atlee added. "Don't overlook the possibility that someone who's been here could be of help. Who or what are you looking for?"

Thackery traced circles on his desktop with a forefinger. "A menace," he said presently. "A terrible menace to everything we believe in."

"I find your melodrama a bit insulting."

Thackery raised his head to look at her. "If you were walking in a living cluster—any cluster, anywhere on Earth—and saw a child lying in a walk bleeding from open sores, you'd signal a Medilift."

"Anybody would," said Atlee, puzzled by the turn the explanation had

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taken.

"Not a Renan," Thackery said angrily. "A Renan would step over him and go his way."

"Not all of them, surely."

"All the 'moral' ones. I saw it happen. No one stopped. Eventually the boy crawled—literally crawled—into a ditch and died there. I was using a remote Observer or I would have helped him. If they didn't stop me, that is. I saw that, too, more than once. The Renans have been schooled from birth to think only of themselves. Their worldview, the Kiri, conveniently absolves them of any guilt. They've institutionalized brutality, and made a helping hand into a grievous insult. 'What is, is,' they're taught. 'Do for yourself,' they're taught. And they do—with a callousness that has to be seen to be believed."

"If you hadn't sealed the records of your expedition, I would have seen by now. I checked before coming to see you."

"I sealed them as an act of mercy. I'll release them to you, if you like."

Atlee shook her head. "Rena is forty lights away, and a tiny colony. I don't see the 'menace,' " she said, her emphasis of the word a rebuke.

"They're fanatics. They find us soft, diseased. They've sent missionaries—better to call them revolutionaries. I saw one ship lift off, and a dozen more were waiting—built for no other reason than to convert us to the Kiri. They've made a godhead of self-reliance, and wrapped it in the kind of mummery that simple minds find attractive."

"Where are they, then?"

Thackery frowned. "I don't know. They've gone underground, obviously, and we haven't been able to follow. No one keeps the right kind of records. With Earth's open immigration and the Anti-Discrim Acts, there's no way to track people by their planet of origin. There are no references to Rena or the Kiri in the media searches. The records have been compromised by Renan sympathizers, of course—especially the port logs."

He shook his head. "They have no record of a Renan ship ever using the facilities. Officially, Rena is still considered nonspacefareing."

"Perhaps they didn't make it. You said they were new to it. They most likely died en route."

Thackery would not hear of it. "No, they're down there all right. Perhaps here, too. If they lost a ship, they'd send a dozen more. That's the kind of people they are."

"You've looked for them in every way possible. Haven't you simply proven they're not here?"

Thackery walked to the great-port and gazed down at Earth. "When I listen to Earth's ComNet, I hear their ideas, again and again, like pathogens spreading in a body. They came here to spread their poisonous ideas. Those they can't disguise. By their ideas I'll find them. I don't know how many of those fanatics there are, or how much of a head start they have. But I'll find them—and stop them." He turned to her. "Can I count on your help?"

"No," said Atlee, rising. "But we have an understanding—for now."

* * *

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"You were right, Tenaeo," said Eric Lange to his wife's image on the Datatap. "Were you ever right! I got here this morning and found my mailfile already full. They're coming in faster than I can review them. I'm fifteen thousand behind. Fifteen thousand!"

"Wonderful! But I'm not surprised. Found anything with punch?"

"Here's one I like. 'My art history instructor gave us a list of outstanding contemporary artists. None of them were from Earth, so I asked him why. He told me that there was not a first-rank creative artist on the planet save for one or two who came here from somewhere else. He said it was because Earth society was too homogenized, too bland. Creativity is a response to stress, he said, and the last real period of creativity in Terran art was a one-generation backlash against the sterility—two hundred years ago.' "

"Save that one," said Tenaeo.

"I did. Tenaeo—I've been thinking. You called this so well. I've been foolish not to take advantage of your talents. I'd be an idiot if I didn't come to you for more advice. Will you help? I'm ready to put this side of it in your hands."

"You take care of the words, I package and promote?"

"Yes."

"Will I get an argument from you on every little detail?"

"You'll get an argument when you're wrong," Eric said, grinning.

"Ah—no arguments, then. I accept."

"Thank you. I wish I was there—I'd like to hug you."

"Just hold that thought," she said warmly. "How many of those letters are reply-coded?"

"Maybe three out of four."

"Good. Keep all of the names and return codes, even if the stories aren't worth saving. Get a subscriber list from the net and annotate it with any personal data. We'll need it for the next stage."

"Which is?"

"We give them something to join, so that you represent not just yourself but an organization."

"Card-carrying elitists?" Lange said dubiously.

"Whatever it takes to give them a sense of identity and community, and to help them activate their convictions. We'll need a name that capsulizes what we're about and has the capacity to stir up a little pride. 'Yes, I'm a blank-blank.' The name should be your choice—give it some thought."

"I'm not sure that's the way to go."

"Eric—if all you do is record your little video essay every week and do nothing to follow up, you're as much a hypocrite as any do-nothing subscriber. People always act in accordance with what they view themselves to be—what 'tribe' they claim membership in. If you expect them to act as individuals, you're being naive. In numbers there's more than strength. We'll help them find their tribal identity. Then we can start to move."

"Director?"

"Yes," Thackery said.

"McCord, ComNet Study Team. We have a hit."

* * *

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"There are two ways to destroy human beings," said the electronic figure of Eric Lange. "One is to deny us everything: slavery. The other is to give us everything: socialism. They work equally well. The difference is that we let people defend socialism in polite company."

You grew up with a red sun in your sky, Lange, on a planet which spawned no native life as bright even as a good dog, Thackery thought angrily as he watched the telecast. *But you'll happily tell the Home Planet what it is to be human.*

"The most terrifying socialism of all is intellectual socialism—that any man's ideas are as good as another's, that the products of creativity ought not be criticized, that it's more worthy to listen well than to have something to say. Lies and falsehoods, sold to us two centuries ago. You know better. On a scale of one to ten we are not all fives."

I saw those two centuries, and more: the times that preceded them, Thackery said in his silent debate. *But you, the newcomer, the outsider, offer the history lesson.*

"Lies that have made us the least of all planets.

"A few days ago, I heard a Boskovian art historian speak on the great contemporary artists. He was more knowledgeable than we have come to expect from our own experts, and showed us many beautiful works. But not one of the fifteen artists he discussed was a native of Earth, and of the three that lived here for a time, none did their best work here. When I questioned him on that, he said that there was not a first-rank creative artist on the planet.

"I asked him why.

"He couldn't tell me. But he tried to comfort me by saying that Earth's crafts were well thought of elsewhere.

"It's the same in other fields. We have many skilled musicians, but no composers. We have storytellers famous on many worlds, but our writers contribute no enduring works. Even the Planetary Survey Service, whose headquarters we are so proud to claim as an orbiting client, takes few of our young people except to service the ships that carry other planets' sons and daughters to new worlds."

Thackery was furious to hear the Service cited in support of Lange's thesis. *You'll say anything to mislead them, twist any fact, stoop to any propaganda,* he thought. *No less than I expected from a Renan. Anything to spread your gospel of self-love.*

"I can tell that art historian why. It's because no one burns. We're told not to dream, not to aspire. Aspirations are too threatening, and dreams might bring on change. We've let ourselves become homogenized, seduced into becoming part of a group organism. We've bought the lie that achievement equals selfishness, and it has cost us our excellence.

"I'm here to say that I am not a neuron in a megamind. I am not a standardized part on a social assembly line. I am not a service robot to be programmed for the good of others. It's not cooperation which fueled our rise from the plains of Africa but questing and curiosity and struggle. We have forgotten that. It's time we started to remember."

As the screen faded to black, replaced

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briefly by Lange's name and mailcode and then the logo of the originating ComNet studio, Thackery exorcised his fury with a string of curses from a dozen worlds. Then, calmed but hardly content, he sat back to compose a more effective response.

Tenaeo threw her arms around Lange as he exited the studio.

"Wonderful! Wonderful!" she said, kissing him excitedly. "I think we've broken through. I checked the service and calls are already coming in. We're moving!"

"Do we know where we're going?"

"Yes," Tenaeo said confidently. "Next week we launch your support group—so decide what you want to call it. And I'm going to analyze the responses from this and the last show to find out where your greatest concentration of supporters is."

"Why?"

"I thought that'd be obvious. It's time for a personal appearance."

Thackery had no power over civilians on orbit or civil matters downwell, at least under the present laws. He regretted it even as he admitted it, though an arrest would likely only serve to alert the other Renans.

But those broadcasts could not be permitted to continue. Thackery recognized the powerful appeal Lange's words and youthful vigor could have for a less discriminating listener. Lange must be denied his audience.

Thackery studied the ComNet directory. It was extensive, for ComNet was the largest of the government corporations—to be expected, considering its 1,000 channels and 100,000 studios. And in such a large machine, it was important to find the right place to push to make it move. When he found it, he made a call.

"This is Thackery, Merritt Thackery. Do you know me?" The voice was his authoritative best; the question loaded, since the man he had called had once produced a glowing documentary on Thackery's early years with the Service. Now he oversaw subsidy video, the program under which Lange's "Night Thoughts" show appeared.

"Of course, Director. I'm so pleased to talk with you. What can I do for you?"

"I'll be blunt. The service has become concerned about some of the programming you're producing and broadcasting. To avoid embarrassing you or interfering with your operation, I decided to contact you informally. I hope some agreement can be reached to bring our interests in line?"

NOTICE TO ALL COMNET PRODUCERS AND PROGRAM ORIGINATORS

An ongoing evaluation of the subsidy programming plan and the distribution costs associated with full-net transmissions has resulted in an adjustment to the reimbursement schedule. This adjustment brings the charges more in line with actual expenses incurred by ComNet, assuring the future vitality of our operations. The new schedule appears below.

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	(Minimum Sub)	(Distribution)	(Cost/minute)
LEVEL I:	None	Local	None
LEVEL II:	None	Full Net	$50,000
LEVEL III:	20 million	Full Net	None
LEVEL IV:	30 million	Full Net	Royalty

Other changes which will be reflected in the new contracts are:

*Minimum contract time has been increased from 5 minutes to 20 minutes.

*Level II originators must post a bond for the full amount prior to broadcast, with reimbursement if appropriate to follow determination of ratings for the broadcast.

*The ratings averaging period for classification purposes is now six consecutive broadcasts.

The current ratings average for your show(s) are listed below:

9058KL "NIGHT THOUGHTS" ERIC LANGE 18,678,000 SUBS. LEVEL II

"A meg to get on the air again. A meg five to do our regular show," Lange said gloomily. "We can't even afford to tell people how much we need their money."

"Believe me, Eric, this notice is the best possible news we could have gotten. It means that somebody is taking you seriously enough to be scared of you," Tenaeo told him firmly.

"Are you saying this was intended to shut me up?"

"Exactly. Every change hurts us. They've denied us royalties, cut you off from your supporters, upped the fees beyond our means, and made it harder to climb back to where we were."

"And this is the best possible news? What's the loophole that will put me back on?"

"There is none. But they haven't hurt us. They've just forced us to move a little faster than we otherwise would have. We go ahead with the speech in the Montevideo cluster next week."

"How can we notify anyone that it'll be held? We'll have an empty hall."

"My company will stand you the cost of a mass mailing of announcements. Except now you won't be asking them to join a support group. You'll be asking them to join a political party."

"Otra vez?"

"You're going to run for supervisor for Sudamerica District 5. Under the Free Election Laws, that will get you six hours' unstructured telecast time within the district, plus two hours' debate and question time continent-wide. And unless I miss my guess, some attention from the ComNet news channels as well." She sat back, a satisfied expression on her face. "Things should start to get interesting now."

Thackery watched from the terrazzo of Lodge Lucretius as an ocean fog spilled over the top of the coastal hills and into the valley of Benamira. Once again the enclave was proving to be a special place for him, its gentle magic worked though a blend of tradition, un-

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hurried leisure, and natural beauty. Before coming, he had wondered if the progress on the Lange affair had been enough to open him to Benamira's blandishments. Happily, it had been.

A droning sound overhead drew his attention, and he watched for a moment as an AES airskipper descended slowly toward the landing site at the north end of the valley. Wondering for only the briefest time who was aboard, he reentered the lodge and began to prepare supper.

The aroma of his meal was still in the air two hours later when he heard an unexpected sound: the door chimes. For a resident of a lodge to have uninvited company was odd enough, but that whoever it was should show up without prior notice was unheard of. Thackery padded out to the front entrance in his robe. He was not surprised when he saw Diane Atlee waiting impatiently to be admitted.

"I thought we had an understanding," Thackery said.

"It's over if what I heard about you is true." She brushed past him and into the entryway."I'm told that you had Tymorian here this week, and Belgrano, and Williamson," she said, naming three members of the Planetary Council.

"True enough."

"I'm also told that the last report to reach you before you came down here was the genetic analysis of the Renan tissue samples you brought back with you."

"There's no limit to your encyclopaedic knowledge of me."

"I'm afraid there is. I don't know the contents of the report, or what you and the council members had to say to each other. But I can make a good guess. The analysis identified one or more unique mutations that would mark the bearer as a Renan."

"Thirteen of them, if it matters."

"And you're pressuring the council to make genetic mapping part of their citizen registry system."

"I simply pointed out that there would be innumerable advantages to having such information available, and that the upcoming census would provide the ideal opportunity. I have that right."

"To use your position as PSS director to promote personal goals unrelated to our work? I think not."

"You still don't seem to realize that there's an alien dogma being spread by people who are using the freedom and political power we give them against ourselves. We don't need to give these people free access to our citizens. We don't need to support the circulation of these kinds of ideas."

"Is that what you told the ComNet people?"

"In essence."

"Disregarding the fact that Lange is too young to have been on one of your imagined missionary ships, that he was born in Arizona, and that you are completely without evidence that he's even so much as heard of the planet Rena."

"Born of and raised by what kind of people? Not to mention that if they could send one ship thirty years ago without us detecting it they could certainly have sent another one three years ago. No, Diane, you can't sway me. He is Renan. Every time he speaks he condemns himself. But he's not the problem

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now. He is under control."

"He's been censored, you mean."

"Of course."

"And that doesn't bother you."

"Of course not. I saw Rena. These ideas need suppressing."

"And you don't trust people to see that themselves and reject him. Or concede them a right to choose what you think is the wrong idea, if that's what they want."

"Does a baby have a right to taste atropine or strychnine?"

"Are we babies?"

"In some ways." Thackery stared at the floor for a moment, then turned and walked out onto the terrace, now bathed in moonlight. Atlee followed.

"I wonder if you didn't miss the point when you were on Rena," she said when she caught up to him. "Did you ever admit to the possibility that they might be right, at least for them? You more than anyone should know that there's no one way to make a human society."

"And you more than anyone should be ready to admit there are some wrong ones. If they preached servitude for women, would you be so quick to defend them?"

"Under some conditions male domination might confer advantages on a society. Under most conditions it's a waste of human resources and doomed to failure. Different problems call for different solutions. Theirs won't work here. If they were to catch hold, they would have to be translated to reflect our reality—and then they aren't Renish ideas anymore. They'd be ours."

"You don't understand. You're not from Earth, after all. And you haven't seen what I've seen."

The needle landed; Atlee's eyes blazed. But her answer was calm and measured. "You realize that you haven't controlled Lange, or his ideas," she said. "Both will be heard despite you."

"How?"

Atlee enjoyed his immediate distress. "He's running for supervisor. Apparently he's to announce his candidacy at a rally tomorrow in Montevideo. Want to go, and see the demonbeast up close?"

Thackery heard her goading tone, and saw on her face pleased anticipation of his distress. It was erased by surprise when he said yes.

"It's too small," Lange said with dismay when he saw the hall where he was to speak. "And we need an Orator's screen."

"Nonsense," said Tenaeo. "You need to launch this not only with the right words but with the right feeling." She walked to the railed edge of the third balcony and looked down.

"Doers, not watchers, remember? Here they'll feel like they're standing next to you—the real you, no projection, no electronic construct. And it's much better to pack a small hall than to speak to empty seats. Trust me. You'll see."

He saw. They filled five thousand seats and still they streamed through the doorways and up the ramps. They lined the back walls, occupied the aisles, and spilled over onto the sides of the stage.

He thought to have to pick his way

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among them, not an entrance to please Tenaeo, but they moved aside for him, watching him curiously as they did. Their vigorous chatter faded to a murmur as he stood before them.

"Thank you for coming," he said, the tiny microphone carrying his voice to each as if he stood within arm's reach of them. "For more than a year now I've spoken to cameras and studios and the computers of ComNet. But I always meant my words for people—you. And I'm grateful you've come to hear them."

A ripple of warm, friendly applause answered him. During the interruption, he picked out Tenaeo, sitting unnoticed near the center aisle. He was sure she was smiling.

Also near the center aisle sat Thackery, and he was not smiling. The applause annoyed him. The sight of ComNet mobile camera globes hovering in the hall angered him. His expression set him apart: cold and hostile, where those around him were relaxed, curious, pleased. Beside him, Atlee watched his face for some sign of acceptance, if not the speech, of Lange's right to give it and the crowd's right to hear it.
She watched in vain.

"There were warnings," Lange was saying. "William Clifford, a man who would be here tonight had he not lived nearly a thousand years ago, a man who was in every way one of us, saw what was coming.

" 'A race which is fixed, persistent in form, unable to change,' he said, 'is surely worn out, in peril of extinction. It is quite possible for conventional rules and habits to get such power that progress is impossible, and the race is fit only for death. In the face of such a danger, it is not right to be proper!' " Lange said ringingly.

"Clifford was right. But no one listened. We went on taxing the winners so that losers could be made equal. We went on legitimizing the claims of the have-nots and would-nots and could-nots. We went on elevating mediocrity. And we taught our children that that was what it meant to be civilized.

"They will ask us what we stand for. We will tell them. We believe in survival." He was cheered.

"They will ask us what we want. We will tell them. We want freedom to grow." The cheers resounded.

"They will ask us what we offer. We will tell them. We offer change—change for the better if we can, but if not then change for its own sake. We have a right to live in interesting times. We have a right to struggle, and if we are worthy, to greatness."

They told him, with six thousand voices, that they agreed. He waited—not that he could not be heard, but with instinct rather than plan he wanted another mood. They quieted.

"They will ask us our name. And we will tell them. We are the not-average. We are the non-followers." As he continued, the sound of voices crying *yes* climbed steadily to a roar. "We are the un-mediocre. We are the movers. We are the dreamers. We are the builders and planners. We mastered fire. We invented writing. And we colonized the stars. We are The Nines. We are The Nines. And we will not be denied our

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birthright." He thrust his right hand high in the air, his fingers in the sign language symbol for nine.

"The Nines! The Nines!" they chanted as he climbed down from the stage. Surrounded and swept along by a buoyant human tide, he moved up the center aisle. The chant became "Lange! Lange!"

As he neared, Thackery fought his way to the edge of the mass, held back at the last by his own people. "Tell them the rest, Lange," he shouted above the tumult. "Tell them you baptized them in the Kiri. Tell them about the dead babies on Rena! Tell them about the suffering your code will bring!"

The tenor of Thackery's voice carried through to Lange's ears, and he looked at Thackery, first wonderingly, then with a spark of recognition, then with a profound perplexity. But Lange was carried along before he could give answer or even feel certain he grasped the question.

A moment later, Thackery at last allowed himself to be hastened toward an exit, for he saw that the disciples who surrounded them and had understood were turning to deal with the heretic.

Lange stared at the freeze-frame of the ComNet recording. The mike had not captured the dissenter's outburst, but the cameras had caught his face. "Do you know who that is?" he asked, settling on the edge of the hostel bed.

"No," said Tenaeo. "Is it important?"

"Unless I'm very mistaken, that's Merritt Thackery."

"Should I know the name?"

"If you had a decent social studies curriculum. He was one of the pioneers of the PSS. He's the one who made First Contact with the D'shanna."

"I didn't know he was still alive. What was he at the rally for, I wonder?"

"Not to support me." Lange took a long draught of water from the nightstand tube. "He was furious at me. Presumably at what I said." He shook his head unhappily. "I wish I could talk to him. He should be—he is—one of us. He's a Nine. Hell, he's a Ten."

"Not at all," said Tenaeo, taking his hand. "If he doesn't see, if he stands in the way, then he's declared himself not one of us."

"You don't understand," Lange said, pulling away from her touch. "When I think about what people could be if they were free, I'm thinking about people like Thackery and the others who started the Second Space Era. I'm thinking of people who had ambition and took on challenges."

He walked to the video and stared at the screen. "He can't know what it's like now. He grew up in a different time. He doesn't realize that a Merritt Thackery could never emerge from this Earth. I think I could make him understand."

Tenaeo came up behind him and slipped her arms around his waist.

"He's not important," she said softly. "Tonight you started something that's going to change us. Keeping that momentum is what's important. He's an old man—part of the power structure, tied up with the status quo. Even if the young Thackery would have joined you, this one never will. Don't give him another thought."

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He turned and made the hug reciprocal. "I suppose you're right. You said we'd know we were getting somewhere when they start to fight back. That someone like Thackery would take notice of me—well, maybe this is the beginning of the fight."

A brittle silence reigned in the airskipper on the way back to Benamira. Twice Atlee tried to get Thackery to talk, and twice he cut her off harshly. After the second time she sat stiffly and allowed her anger to percolate until it reached a level that could not be contained. It came out poisonously acid.

"Well, what will it be? Will you hound him to suicide, or set a mob on him? Perhaps there's a few Command officers who wouldn't mind working up a little political assassination at their director's request. Then it'll be Rehabilitation for his misguided followers, of course. Or are you conniving to ship all the Nines to some choice metal-poor planet near the edge of a stellar ecosphere?"

Thackery averted his gaze to the turbulent cloud formations below them, lit white from within by lightning and red from the west by the horizon-eclipsed sun. "You don't understand. You can't."

"Show me the Rena records."

"It's more than that," he said, staring out the window.

I know, she thought. *It's being four hundred years old and burying eight generations of lovers and children. It's feeling more alone on a crowded planet than in your tiny interstellar ship. It's losing your own era to the history books and with it the ability to live in the present. I know—but do you?*

Aloud, she said, "Let him be. He's the first original voice in a century. He stands to inject some vigor into a political process that's been entirely too tame and orderly for too long. What's his message, after all? A call to excellence. Not infanticide."

"That will come."

"Of course—you saw it on Rena. Rena is a young world of ten million, and we an old world of eight billion. Different worlds call for different ideas."

"And we don't need theirs."

"So what will it be—assassination, deportation—?" The acid was back.

"A month from now, he will lose the election," Thackery said firmly. "A month more and he'll be forgotten, and then he can be dealt with directly."

"What if he doesn't lose?"

The reflection in the window glass was of a grimly determined man. "He will. He will."

"Bosman. This is Merritt Thackery. Do you know who I am?"

The thin-faced man blinked nervously for a moment, then smiled. "Of course," he said. The smile was in response to the Quicksearch biographical data which flashed onto his screen, superimposed on Thackery's image. "Of course, Dr. Thackery. May I be of some help to you or the Service?"

"I have a deep interest in seeing that your opponent does not become Sudamerica District 5 supervisor."

"I have a deep interest in that myself," Bosman said with a grin.

"So I presume. If I can, I'd like to assist your campaign and help make sure

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we aren't both disappointed."

Bosman's grin widened. "You could help me most by allowing me to announce that such a distinguished man as yourself supports me."

"I don't support you," Thackery said coldly, collapsing Bosman's grin. "I oppose Lange. The two are not the same thing. And I can't become personally involved. The assistance I had in mind was financial and technical."

Bosman recovered quickly. "Of course I understand that in your position you are not free to act as your heart might dictate. Yes, we have needs. If you would tell me who will represent you in this so that my campaign manager may contact them—"

"Give me his name," Thackery interrupted. "I'll be handling this myself."

Bosman's needs were great. Thackery provided funds, most from the Director's Discretionary Fund, to conduct issue analyses and construct voter profiles. Breaking a much-winked-at law, he hired a team of speechwriters to add some appeal to Bosman's personal appearances and a production company to orchestrate the six hours of campaign video. A fashion consultant and grooming specialist were contracted to provide Bosman with an image which communicated the right message: young but mature, conservative but independent, smart but of the people.

But the influx of money did not have the impact Thackery wanted. Bosman struggled with the prepared speeches, and a speech consultant struggled with his flat, mechanical delivery. The slick videos played to modest, even paltry, audiences. ComNet units on other continents, not bound by the Balanced Election Coverage laws, ran features introducing Lange to their viewers as an exciting maverick.

Consequently, with the month-long campaign period three-fourths gone, Thackery was facing the discomfiting fact that where Bosman was a candidate, Lange was a cause. Thackery paid to have another law broken: he arranged for a voter poll, disguised as a test of the video-based election system. The poll, if it could be trusted, confirmed his fears. Absent a miracle, Lange was going to win. And the miracle would have to be something more than money.

In the self-deluding translator of his brain, Thackery felt his desperation as responsibility, his fear as compassion, his insecurity as prudence. What could not be allowed to be was about to come to pass. He was not conscious of making a decision when he arranged a televised speech for himself over ComNet Sudamerica. And if he thought at all as he unsealed the Renan mission records, it was to tell himself that what he was about to do was necessary.

Thackery sat on a sunlit grassy slope twenty klicks from Benamira and faced a robot ComNet camera globe. A silver PSS Observer globe hovered just above the ground beside him, while the angled shapes of mountains served as a backdrop.

"I've been told that most of you watching tonight know me. That I am the subject of test questions and assigned readings. If it is so, then you

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have the advantage of me, for I know very few of you at all. But I love you all as brothers and sisters, and I love this planet, my home."

"My God," said a young ComNet technician half a world away. "He's got a 14 share." The tech's awe was honest. With a thousand channels competing in every household, even a 10 share represented a notable communal experience. No one in the subscriber monitoring center could remember so much as a 12.

"He's Merritt Thackery," said one, and that was explanation enough.

"Sssshh," said another.

"Nearly four hundred years ago I left here for the first time, on the survey ship Munin. I've spent most of my life in space or on other worlds," Thackery continued, a breeze rearranging his still-thick but silver-white hair. "It was a duty, because there was a job that needed doing. It was a privilege, because many have wanted what only a handful could do. It was an honor, because I was representing a planet and a people of whom I was proud. I've stood on the surfaces of forty-one worlds. Every one was different. Every one was special. But every time I came home even more convinced that this is the most special place of all."

"What the hell is he up to?" demanded Diane Atlee, alone in her office in the bright permanent star in Benamira's sky. She lashed out at a call button. "Tony! ComNet Sud 24. Did you know about this? Did anyone know about this? What the hell is he up to?"

"Less than six months ago, I returned from a world known to its people as Rena. I went there to see what we could learn from them and they from us. I used tools like these," he said, touching his hand to the Observer's control and rendering it invisible, "to move among them freely, to see them as they are and not as they may have wanted to present themselves. They were humans, of course, descendants of First Colonists, but I found Rena a most inhuman place. Let me share with you what I saw."

He showed them a hillside slum in the city of Braun, and youths hunting the animals that lived in the sewage that stood ankle-deep in the basement of their house. He showed them thousands of whitening skeletons in a greening field and the razor-edged weapons that had put them there. He showed them a woman battered into insensibility and then raped with a metal truncheon.

And he showed them children: children with bellies swollen by kwashiorkor, children lying crying in pools of their own excreta, children battered, children dying. Horrid images which gave way to sights still more horrible, sights which seared memories and brought visceral pain.

In Montevideo, a woman member of the Nines clenched her teeth and whimpered, "How can they show such things," and moved to change the channel. Her housemate intervened. "How can they do such things, you mean," he said, and watched numbly as the grotesque images marched across the screen.

"He's up to 19," the young tech said wonderingly. He said it to himself, for the others had fled the room retching.

"Once sights such as those were commonplace here—yes here, on Earth. We can wonder at the cruelty of our

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ancestors, but we can't deny the fact of it," Thackery said. The sight of him again on the hillside was a tangible relief. "I wondered at the Renans. So I asked them, how do you explain the shame of your slums, the callousness of your hearts?

"And they told me that they were proud of their slums. They told me that the dead soldiers and the crying children and the crippled aged ones were the medicine which made the rest of their people healthy. They told me that their religious philosophy forbade them from demeaning others by offering them help."

In Pôrto Alegre, Tenaeo Lange called home and roused her husband. "Eric, you'd better turn on 24. It's that man who was at the Montevideo rally—and I don't like the direction his speech is headed. I recorded it from the start—I'll transmit it when I hang up."

"I was glad to leave Rena, gladder than I'd ever been to leave a foreign world behind," Thackery said. "But in a way I'm not sure I left Rena completely. More and more, I hear Renish ideas promoted by glib young men, spoken well of by politicians and decision-makers, embraced by the elite. They are carefully disguised, but they are Renish all the same. Give us freedom to succeed. They never mention those who will fail. Let us live our dreams. But some will live nightmares. It is the code of the Renan Kiri I hear, a murmur now, perhaps a roar tomorrow that will sweep through and change our pretty little world into another Renish hell."

"That Lange fellow. He won't call him by name, but he's talking about Eric Lange," said thousands.

"He can't mean us," said the Nines. "We don't want any of that to happen."

"I can't help remembering what the Renan leader said to me before I left," Thackery said, standing outlined against the mountain. "He called us slothful and coddled. He said that we were saddled with the deadweight of genetic misfits. And he promised to send missionaries to put us on the right track, as an act of compassion. 'Earth can never be saved if no one speaks the truth to it,' he said.

"I don't believe it," said the ComNet technician. "A thirty. Thirty!"

"I don't believe it," moaned Eric Lange, cradling his head in his hands. "He's made me out to be the killer of babies."

"Are they among us? Is it not just Renan ideas but Renan voices that we hear? I can't say, though I have my own belief. In either case, we have to turn away from them. We have to fight them and preserve what's true and good about our way of life. I speak only as myself and for myself. You can speak for all that we mean when we say human—when you choose the ideas you embrace and the leaders you elect. I pray you will."

"Let's get a crew out to Lange's house and get his reaction," bellowed the ComNet dispatcher at the Pôrto Alegre studio.

"We don't have to wait a week to vote," said a hard-faced woman to the noisy circle of neighbors with whom she had watched the broadcast. "I know where he lives. We can show him what we think of him. He thinks hurting is

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so noble—"

"Let's do it!"

"Those poor kids—I can't stop seeing them. One looked like my Cami."

"Let's do it."

"Show him!"

"Get him!"

Thackery's personal communications center lay in an upstairs bedroom and chimed politely. Outside, slumped in a chair on the patio, Thackery watched Venus appear in a darkening western sky and tried to find the self-assurance he had felt two hours ago. He did not hear the alarm. Ignored, the bell changed to an angry buzz. Though audible through an open window, the sound failed to penetrate Thackery's consciousness, which was wrestling with questions he knew he would have to answer. The buzz changed to a piercing whistle, and Thackery sat up with a start. He climbed the stairs slowly. The answers were not ready, even if the questions were.

But it was not Atlee. It was a monitoring program, residing in his office computer, dutifully informing him in a pleasant voice that a broadcast concerned with subject "ERIC LANGE" was in progress on ComNet 118.

It took Thackery but a moment to find the channel in the video net. It showed a live scene: a small Fuller house lit by the lights of Sprint vehicles and under siege by those who had driven them there. The mob was small but grotesquely animated.

"We don't yet know whether the candidate is inside," the ComNet announcer was saying. "And it's not clear yet exactly what the demonstrators want. But it's reasonable to assume that they don't count themselves as 'Nines.' "

The camera globe caught a glimpse of a face at one of the house's windows. The crowd saw it too, and surged forward. A flying object turned the pane into a glittery spiderweb a moment after Lange moved away.

Thackery was on the phone, trying to contact Sudamerica Peace Enforcement. "Where are your people? I want him protected—rescued," he demanded.

But it was too late. The mob was not content with half-measures, and the house could not withstand their frenzy. One of the men produced a cutter beam, and with it he opened a hole in the metal wall of the structure. Thackery watched, his throat dry, his hands trembling, as the mob poured inside and murdered Eric Lange.

Two hours later the results of the genecomparison tests on the corpse came through. The report was confidential. No other human eyes had or would see it. But when he read that Eric Lange was not Renan after all, Thackery could not help but begin to scream.

A day later Diane Atlee found Thackery in his office, his memento shelf half cleared, empty shipping cases waiting for the rest. He took no notice of her entrance, and so she stood near the doors and watched him for a time.

"I understand you've retired," she said finally.

He nodded wordlessly, his back to her.

"Where will you go?"

"Benamira. To stay."

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He continued his work, enveloping each object in a coating of foam from an aerosol, holding it for the few seconds it took to solidify, then placing it in a shipping cask.

"Say it," he said suddenly. "You have the right."

She was silent.

"Say it, goddamn you, that's what you came here for. Tell me all the mistakes I made that you'd never have made."

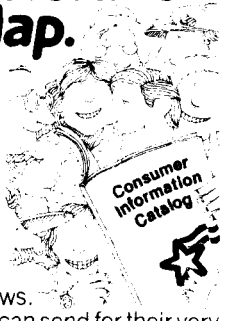
"I didn't come here for that," she said. "I just have to know if anything changed for you. Did you find what you were looking for—did you find the menace?"

Thackery nodded almost imperceptibly. "Yes. Oh, yes," he whispered. He set the Gniva fertility icon slowly back down on the shelf, and turned toward her. The sight of him shook her. It was as if all those years, the years that weren't supposed to count, had all at once declared themselves on his face. No, not in the face—just the eyes. Great age she saw there, emptiness; and she wished she had not come to see him. He met her gaze for just one moment. "The menace is me," he said softly, sadly. Then he turned back to his packing, and said nothing more.

It took Tenaeo Lange an hour of walking in the Parque Nacional de São Joaquim to find the Kline transmitter that she had hidden there a decade earlier, and another hour of deep meditation to recall the codes and coordinates implanted in her in a yellow room in the city of Braun on the planet she called Rena-Kiri—"True Home." Because she was a Renan, she sent the report that told of success—of an awareness awakened, of an impetus begun, of a martyr made—and an hour later accepted the congratulations of the new Elder of Rena-Kiri.

Then, because she was a human, she flung herself on the ground and cried for Eric Lange. ■

The Book That Put Pueblo, Colorado On The Map.



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Jay Kay Klein's biolog

Many *Analog* authors are or have been college teachers. Others, including Michael P. Kube-McDowell and Hal Clement, teach at the secondary level. Mike was a National Merit Scholar as a high school student himself, going on to a B.A. in science-math education at Michigan State University and an M.S. in education from Indiana University. He currently is on leave from a teaching post in Middlebury, Indiana, in order to complete several science fiction novels. He hopes to turn to writing full-time, a goal recently receiving a big boost with the purchase (by Berkley Books) of *The Trigon Disunity*, a series of novels to begin publication in about a year.

Mike started writing while being bored in a high school geometry class in Camden, N.J. He was raised in that city, though born across the river in Philadelphia. He put together a first (unpublished) novel at MSU, and made his first sale to a science fiction magazine in 1979. The June 22, 1981, *Analog* saw his first story here: "A Question of Compliance." He's also served as a regional correspondent for the *Elkhart* (Indiana) *Truth* and done general freelancing on science topics.

Mike's interest in science fiction arose early, first with Tom Swift, Jr., then with the excitement of the early American space flights. He used to smuggle transistor radios into school not to listen to the World Series, but to hear the Gemini flights. Since then his reading has been almost entirely a mix of science fiction and science fact. The straightforwardness and obvious rightness of physics leaves no room in his universe for ghosts, ESP, flying saucers, auras, or magic. This rationality colors his view of the universe, in which the unexpected happens because of statistical or chaotic probability, not because of some mystic gobbledygook. This attitude towards the universe—as a rational place populated with the unexpected by human beings and their randomness—underlies his stories.

Further insight into his frame of reference may be gathered from the present incarnation of his last name—originally plain "McDowell," but hyphenated since his marriage to a woman of the Kube family. Each claims this was the other's idea. (It should be noted that Kube is pronouced in two syllables: "Q-B.") ■

Michael P. Kube-McDowell

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On Gaming

Dana Lombardy

The Forever War by Joe Haldeman won a Hugo Award in 1976 for Best Novel. It's also now an SF board game for one to six players by Mayfair Games Inc. ($17 at stores, or direct from Box 5987, Chicago, IL 60680).

Joe Haldeman wrote an introduction at the beginning of the rules folder to explain the background and key elements of his novel that are embodied in the game.

In the distant future, we humans encounter aliens called Taurans and a war ensues. It's a "forever" battle because traveling in space between stars takes a log time: decades, even centuries, may pass before a ship reaches its destination. The passengers on the space ship, however, have aged only weeks or months during the trip.

When the ship arrives at the planet, the enemy forces there may be of roughly the same level of technology, hopelessly old-fashioned, or even more advanced than the attackers. There's no way to know beforehand what kind of enemy tech-level you'll encounter.

Most of the combat occurs on "portal" planets which orbit collapsar stars. Because the sun is a neutron star that gives off no heat, the portal planet has a surface temperature of nearly absolute zero.

The game board in *The Forever War* represents a typical section of a frozen portal planet. The board is in six large and six small puzzle-like pieces that can be arranged in several different configurations. The terrain on the planet consists of lava plains, hydrogen ice pools, mountains, fissures, and craters.

Mountains, fissures, and craters help defense but slow your movement. You can move much faster over hydrogen ice pools, but if a piece is "pinned" in a pool, the exhaust fins on the soldiers' powered suits make contact with the frozen gas and the resulting explosion eliminates the unit.

This is a tactical game. Earth pieces represent either four soldiers or one officer. Tauran pieces represent eight soldiers. As clones with a group mind and no individuality, they have no officers.

A Tauran piece is worth less in combat than the Humans, but this is balanced by the large number of Taurans available. It's a classic battle between a small number of very good soldiers against a horde of mediocre ones. If neither side makes a major mistake, the outcome should always be close.

The game comes with 345 die-cut cardboard playing pieces; eighty-three are Earth forces, 139 are Taurans, and the rest are for informational purposes, such as keeping track of turns.

You don't use all these pieces in each game. There are twelve different scenarios, ranging from small engagements to huge battles, and depending on the particular scenario, your side might be on the defensive, or attacking an enemy stronghold.

There are several other important combat pieces, but they're only used in special situations—when they're inside a stasis dome.

(continued on page 169)

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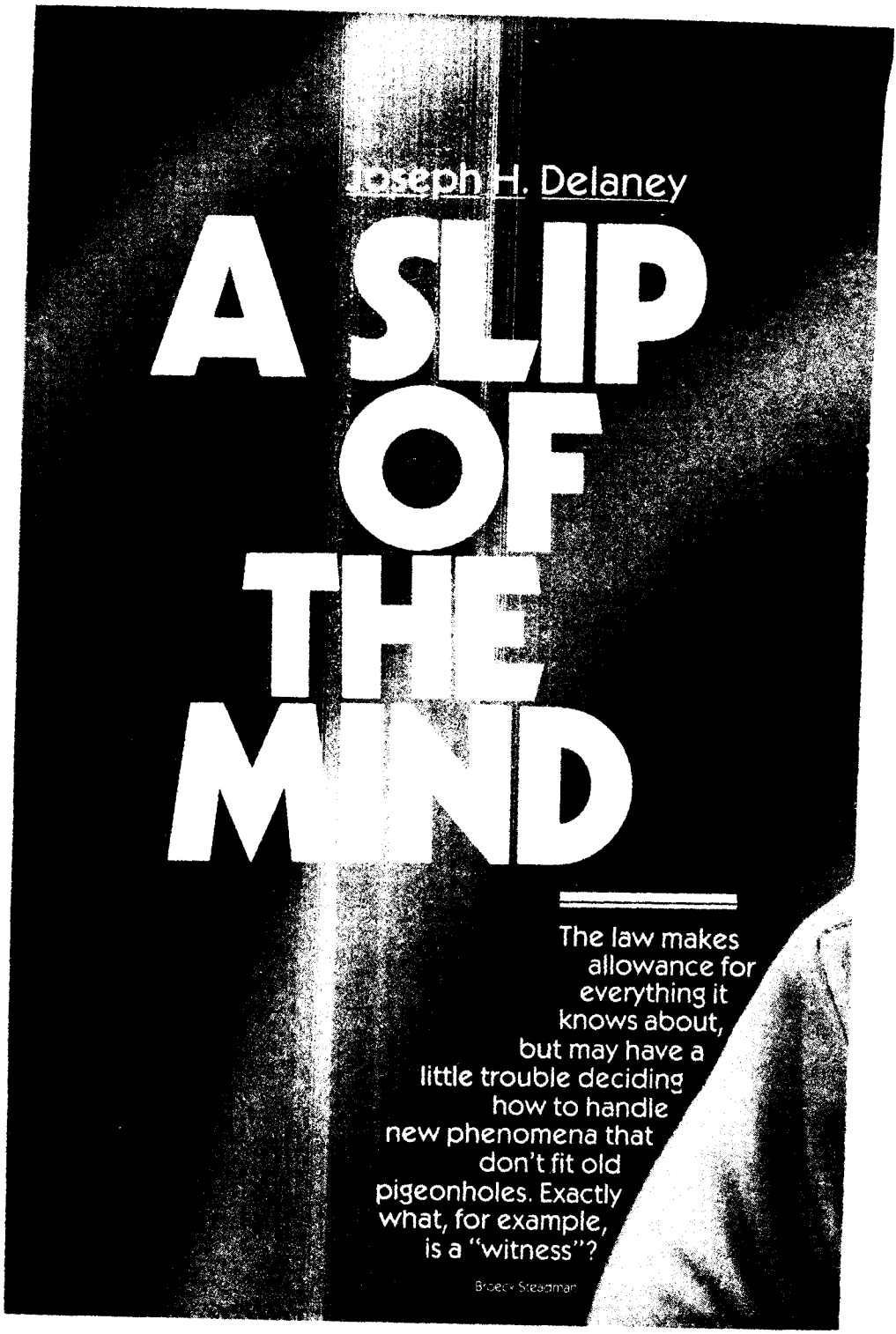
Joseph H. Delaney
A SLIP OF THE MIND
The law makes allowance for everything it knows about, but may have a little trouble deciding how to handle new phenomena that don't fit old pigeonholes. Exactly what, for example, is a "witness"?
Brock Steadman

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Ruth Schoonover had retired from the practice of law shortly after her marriage to Dr. Delmar Schoonover, settling into the role of wife, and mother to Delmar's son, Adam.

Thus she had visited the Nueces County Courthouse only rarely during the last five years, her last appearance being not quite a year ago, to handle the probate of Dr. Clarence Blatchley's estate. She was no longer the familiar figure she had been in the past, to those denizens of the precincts who sought justice or entertainment there.

Bud June, the district attorney, had been pleasantly surprised to find that she had come to visit him, and he made her comfortable in his spacious corner office on the second floor, plying her with coffee and polite conversation. But as the visit wore on, and Ruth had not only failed to enlighten him as to the purpose for her visit but seemed to be running out of things to say, Bud began to feel uneasy. Such behavior was out of character for Ruth, who once had been so bellicose and full of fire, who once thought nothing of taking on the most terrifying of professional tasks. She now seemed subdued, almost timid. She obviously wanted something, but seemed reluctant to say what.

Finally Bud could endure it no longer. He brought the conversation to a head. "Ruth, I am enjoying your company. I want you to know that. You've always been one of my favorite people, in court or out of it, but you're boring me with platitudes. I've known you a long time, and I know you as a person who never minced words. How come you're doing it now? Come clean with old Bud; this is not a social call, is it?"

"It shows, huh?"

"Why are you here, Ruth? What's wrong?"

"You would ask the question that way. To tell you the truth, Bud, I'm not a hundred percent sure anything is; I mean, I don't have any concrete proof anything is, and that's why I'm having trouble trying to talk about it. The circumstances are so illogical, and my source so unusual, that only an old friend like you could possibly take my story seriously. Even you might have trouble swallowing this: what if I told you I knew where there was a dead body?"

"What if you did, as long as you don't tell me it got that way because of criminal activity? The cemeteries are full of dead bodies. If your client . . ."

"What if I also told you I think there was criminal activity; that the victim died of a broken neck, and that he's buried out on the range, west of here. And, by the way, I don't have a client. I'm retired, remember?"

"Just a minute, Ruth. You're not trying to say you had something to do with a killing, are you? Because if you are, and despite the fact that you know what you're doing, I still have to give you the warnings before I let you make a statement."

"Bud, no! It's nothing like that. I don't even know who the boy was. I've never even seen him. I warned you the circumstances were illogical."

"Specifically, where is this body buried?"

"That's part of my problem, Bud. I can't be specific. My source isn't familiar with the area, doesn't know enough about the location to narrow it

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down very much. But from what I was told, I think it's out by where the Missouri Pacific tracks cross the river, probably on the west side. That's just a guess, though."

"A guess, huh? Ruth, are you playing some kind of joke on me?"

"Do I look like I'm having fun, Bud?"

He gazed at her for a moment, noted the look of intensified consternation, and decided that wasn't it. "Ruth—how do you know there's a body, how do you know where it's buried, and how do you know it was homicide? Those are the three things you've got to tell me to convince me your gears aren't slipping."

"I was told."

"By whom?"

"I can't reveal that just yet. Not while there's still a chance I'm wrong."

"When can you tell me?"

"After you dig it up—maybe."

"You just got done saying you don't know exactly where it is. How do you expect me to take you seriously when you ask me to act on the basis of a statement like that?"

"Because I have two other facts, Bud: first, I know who killed the victim, and second, I know exactly when."

"That would help your argument a little. But I suppose somebody told you that, too."

"Yes."

"Ruth, if it was anybody else but you, you'd be sitting on the floor outside my office, with a size-12 footprint on the back of your lap. In fact, I'm not so sure that isn't a good idea."

Ruth, obviously shocked at such words from Bud, shocked him; she started to cry.

June couldn't take that—not only because he remembered the Ruth that was, but because she looked so outright miserable. He knew the Old Ruth would have choked to death before she shed a tear. Clearly, things were different now.

He gave her some tissues and waited patiently for her to regain her composure. When he felt she was ready to continue, he softened his tone and tried to be more conciliatory. "Maybe it would help if you assured me again that you weren't personally involved, Ruth."

"I'm not. Not directly, anyhow."

"Is it Dr. Schoonover; Adam?"

"They're involved in the same way I am, Bud. We all have knowledge of the facts; that's all I can tell you now."

"All right, Ruth. Let me see if I've got this straight: you know there's been a homicide, but you . . ."

"Murder, Bud, not just a homicide."

"O.K.: murder. You don't know who was killed, or precisely where the body is buried, but you know who killed him, and when?"

"That's right."

"Then, tell me that much."

"The killer was Bickford Young. The date was August 12th of this year."

June reached for a pad and pencil. "All right, Ruth, where do we find this Bickford Young?"

"At the Blatchley Institute for Genetic Research. He works for my husband."

"You mean, he's there now?"

"Yes."

"You and Delmar know this guy

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committed murder and you let him stay around?"

"He doesn't know we know."

"What makes you so sure?"

"I can't tell you that."

"Aren't you afraid of him?"

"Of course we are. That's why I came to you."

June put his pencil down and looked up at Ruth again. "Ruth, you know I can't go to the grand jury with a story like this. If you have anything at all, it's going to take a lot of investigation to develop, and you're not helping much by being vague. Of course, if you can give me some real details, or at least tell me why you can't . . ."

"I'm sorry, Bud. I'm torn between two loyalties: my concern for my family, and the obligation I have to my profession. And I'm afraid that whatever I do I'm going to wind up neglecting one of them. I'd hoped you might be able to help me. I came to you because we were friends. But I also understand your situation, and I guess I can't blame you for not wanting to stick your neck out. We'll just have to find some other way to handle this."

"Ruth, it's not that. Prosecutors take risks every time they present a controversial case to the grand jury. It's the way you want me to do it: on blind faith. Ruth, I have a responsibility to the voters and the taxpayers. I'm not a free agent. If I ask the sheriff to go out and dig up somebody's entire pasture, what's he going to say to me? He's going to say, 'Why?' And if I tell him Ruth Schoonover thinks there's somebody buried in it, he'll want to know how you know. What do I tell him—that you had a hunch?"

"I assumed you would at least send Carlos out to take a look around. The ground will be disturbed. The body hasn't been buried there that long."

"Ruth, that might work if you could narrow the search down a little, but you're talking about going over hundreds of acres. Carlos is the only investigator on my staff. Alone, it'd take him years. Why, even if the sheriff got in on this and was able to put his entire force on it, it might take that long. That's a lot to ask when you can't tell me how you know."

"It isn't that I can't tell you, Bud. But there are excellent reasons why I don't want to. Besides, even if I did tell you there's a high probability you wouldn't believe me. That's one of two reasons why I want to find the body first: so I will be credible."

"What's the other reason?"

"Because once you have the body, and since you already know who did it, my informant might not have to become involved at all."

June's face took on a troubled look. "You never struck me as the kind of a girl who'd ever have trouble she couldn't handle, Ruth. I'd like to help you, but I just don't see where there's anything I can do. The manpower alone . . ."

"We'll bankroll the investigation, Bud. Money's no problem. We've got it; you know that. Before he died Clarence Blatchley adopted Delmar, so that Delmar would be his heir. Delmar was also a principal beneficiary under his will, and Delmar's scientific discoveries have made him wealthy in his own right. So if money's the problem, don't worry about it. Just direct the investigation

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officially, and help us get in there to look around. O.K.?''

''O.K. But only Carlos, and only for a couple of days, and only because you're an old friend and an officer of the Court. We'll have to be careful, though. Ranchers hereabouts don't like people poking around on their land, and since we haven't got anything concrete to go on, it may take a lot of poking. I wish you could be more definite.''

''I do too, but I can't. What I've found out so far is largely the result of a process of elimination. I was working from a description that's none too detailed. I can limit the search area a little because I can rule out certain localities, but there are few positive signs to go by.''

''Such as?''

''One road sign, train sounds, the position of the moon at the time the body was buried, a rather large stand of prickly pears, and some cat-tails.''

''If you could get all that information why didn't you just get the address?''

''These are things my informant observed, in his rather peculiar way, and his information wasn't—uh, wasn't firsthand.''

''You mean, he wasn't there when all this is supposed to have happened?''

''Not in the sense you mean.''

''I'm not sure even *I* know what sense I mean. The more I listen to you the more confused I get.''

''Bud, believe me. This is nothing compared to what the effect would be if I really tried to explain to you. Just trust me a little bit more. Now, tell me how you'd handle this kind of search.''

''Well, let's see; how I'd do it. Hm. Well, why not put our people up in helicopters, the way the oil companies do when they're scouting rig locations. That sort of thing doesn't attract much attention around here, and you could cover a lot of ground that way.''

''Fine. How soon can Carlos get started?''

''I'll have to let you know, Ruth. Today, maybe. But he's going to have to know what he's looking for, you know that; and he's going to wonder what part you have in it.''

''Keep that as confidential as you can, Bud. Maybe you could just say the institute is doing its civic duty by helping out with some equipment.''

''I'll give that a try, Ruth.''

''Carlos, what have you got?'' Bud June didn't like telephones without screens. He liked to be able to see whomever he was talking to. But Carlos was calling from a pay station on a roadside, and for some reason the telephone company didn't like to put expensive video equipment out in the open where it could be vandalized.

''Sheriff's boys just dug up a body, Mr. June. Looks like a Caucasian male, maybe 15 or 16; body's pretty well decomposed. They're waiting for the medical examiner now.''

''Where'd you find it?''

''Out on the Mitchell spread. There's a caliche road, running off 77, that leads to a gas compressor. We figure the killer drove down that road and dragged the body across the railroad tracks to where the ground's a little softer. That area floods a lot, so it's mostly sandy clay. The grave was shallow. We don't think the killer had anything to dig with. He probably used his hands, and maybe a

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tire tool to break the crust. It was your typical rush job."

"Uh huh. Sounds reasonable. Did they find any identification on the body?"

"Not that I know of. The killer probably got rid of whatever there was. They usually do. Identity will be hard to check out, with all the floaters we have around here."

"What about wounds?"

"I didn't see any, Mr. June. Of course, being in the ground for a while makes it hard to tell, sometimes, but Sergeant Brownlee thinks the kid's neck was broken. The M.E.'ll be able to tell for sure, when he gets here."

"O.K. Carlos, tell the sheriff I want any press releases cleared with my office. Nobody talks to anybody about this without my authorization. Do you understand?"

"Yes, Mr. June. Uh, what do I give the sheriff for a reason?"

"Just tell him we don't want to alarm our suspect."

"Mr. June, I can't say it's 'our' suspect. You know how peeved they get when we hog into an investigation. He'll want to know who we're after."

"Just tell him I'll see to it he gets full credit for the bust, if there is a bust, and that we're working with an informant who won't deal with anybody else but me. O.K.?"

"Right, Mr. June."

June hung up. He paused a moment to consider this development, then called Ruth. "Ruth, Carlos just called. They found a body: a teenage boy, with a broken neck, they think. It looks like your information was reliable."

"I was certain it would be. How soon will it be before you pick Young up?"

"That might still take a while, Ruth. So far, you've been right. There is a body, and it definitely does look like murder. But there's still the matter of identification; and more importantly, establishing a connection between the body and Young. That'll take time. Uh—unless maybe there's something else you didn't tell me?"

"Nothing really significant. Wait a minute; the motive. I know the motive."

"You do? What was it?"

"Young's a closet homosexual. The boy was a pick-up. I don't think Young ever knew his name. The boy didn't suspect Young's intentions until it was too late. When he found out, he resisted. That's when Young killed him."

"Now how could you possibly know that, if your informant wasn't there?"

"Bud, that part hasn't changed. I still can't tell you. You've got to trust my judgment. Hasn't that been reliable, so far?"

"Yes. I can't deny that, but it still sounds to me like you're trying to protect someone."

"It should, because I am. But believe me, Bud: I'm not concealing criminal activity; I'm doing my best to uncover it. I intend to help you all I can. In return, all I ask is that you leave me and my family out of it. You know how damaging publicity could be for us."

"Sorry, Ruth. I didn't mean to sound like an ingrate. I do appreciate what you're doing, and I'll do my best to protect your family. You have my word."

"And that word's good. I know that. All right, Bud. But please keep me informed."

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June promised to do so, then broke the connection. He sat there for a while, trying to make sense out of the developing case. He couldn't get over the changes he'd seen in Ruth, and the extremely worried look that had been on her face throughout their telephone conversation disturbed him too.

It wasn't long before Bud's thoughts drifted off into the past. His mind went back to the time Ruth Schoonover had first come to town, before she'd become famous. She'd been Ruth Purley then: a young, ambitious, and slightly abrasive associate in one of the big law firms down on the Bluff. At that time her present husband, Dr. Delmar Schoonover, had not achieved his current status as a worldwide celebrity, and had been working quietly at the Blatchley Institute for Genetic Research.

June vividly recalled Schoonover's trial. At the time, it had been of international interest; the whole world had watched. Ruth had defended him, successfully and quite brilliantly, against charges of slavery brought against him in Federal Court, as a result of Schoonover's experiments. Schoonover had altered chimpanzee germ plasm by adding DNA from his own body. The result had been Adam, the first and only representative of a new and artificially created species: a hybrid creature somewhere between ape and man.

This is what had gotten Dr. Schoonover in trouble. A scandalizing reporter from the sensational press had gotten hold of the story, tried to exploit it, gotten rebuffed, and then sought vengeance. She had goaded the federal prosecutor into bringing criminal charges, and there had been a novel trial, at the end of which Schoonover had surprised everyone by acknowledging parenthood of Adam. He won acquittal on that basis, because a parent cannot be guilty of enslaving his minor child.

Ruth had married Schoonover shortly thereafter. For a long time they fought desperately to preserve their privacy from people who made their living minding other people's business. By now things had settled down to relative quiet. The last time the Schoonover family had made headlines was when Dr. Blatchley died. There had been a brief flurry of stories, TV specials, and a couple of books, all claiming to tell the inside story about Schoonover's "brainchild."

Considering all he knew of her circumstances, June could well understand Ruth's reluctance to get mixed up in murder. Especially a murder with deviate sexual overtones, which the media was sure to sensationalize. With that realization, June's admiration for her grew. It had taken real courage for her to do what she was doing now.

The phone rang, jolting Bud back to the present. He leaned forward in his chair and activated his screen. The caller was Carlos Colina.

"Mr. June: I thought you'd want to know. The M.E. confirms death was caused by a broken neck. And he also found some other evidence of a struggle: broken bones in the wrist and right thumb, a dislocated right shoulder, and a broken right collarbone."

"How are you coming on the I.D.?"

"Nothing yet. We're still working on that."

"O.K. Listen, Carlos: without saying why, have the sheriff run a rap sheet on

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a guy named Bickford Young. You might want to tie that in to the DPS computer and get a picture off his driver's license, just in case we can't find one in the mug books. Then get hold of City Vice, and see if any of their guys know him."

"Is he our suspect, Mr. June?"

"Yes, but at the moment that's all he is, Carlos, so be discreet about it."

"O.K. Anything else?"

"Just report to me if you get any hits on the record."

A couple of days went by before there was anything new on the case. Deputies were making inquiries at the gay bars down around the port area, but so far nothing had turned up. Bickford Young had no record beyond a few traffic offenses and one arrest: an assault on a college professor up in Ohio, which evidently had resulted from a classroom disagreement and had no sexual implications. That case had not been prosecuted.

They were also circulating a sketch of the victim in the same area; and though it was admittedly not very accurate because of partial decomposition of the facial tissues, a couple of working girls had said he looked familiar to them, and that he had been some kind of foreigner.

Carlos went down to the Seamen's Center to talk to the director, Gunther Throde. He showed him the sketch.

"Yes," Throde said, after studying the picture. "I believe he was here a few times. Late summer, I think. Yes, if I recall correctly he was a Yugoslav. His English was terrible, so we spoke in Italian, which he knew better, and which I speak with great difficulty."

"Wasn't he a little young to be sailing?"

"Yes. He certainly couldn't have worked in our merchant marine. U.S. seamen have to be at least 18, but other countries aren't so strict. And with the economy in that part of the world being what it is, and some countries so greedy for hard currencies, they will allow anything in order to get it. Wait a minute; I just might be able to help you get his name."

"Good. Uh, how?"

"He used my phone to make a toll call to Chicago; I think he said it was to an aunt. Afterwards he paid me cash, but the number he called will be listed on my bill. I'll dig it out."

Gunther rummaged through his expense file, and after a time he came up with the phone bills for June, July, and August, 2002. "Now, let's see." He checked each. "Ah, here we are—August 11, 4:17 P.M., Chicago, Illinois. Six minutes, $5.60. Looks like the weekend rate. That should be a Sunday. We always have lots of seamen in here on Sundays; that's how I remember. Call this number and the aunt should be able to tell you his name." He copied the number on a pad.

"Right. Thank you, Mr. Throde. Uh, look; we'd appreciate it if you wouldn't say anything about my being here. Our suspect may not know his victim's been found, and we'd hate to have him get wise before we're ready to bust him."

"I'll keep quiet."

Ruth was again visiting June in his office. She looked pale and none too

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comfortable, June noted. He had just finished bringing her up to date on the results of the Young investigation.

"So you see, Ruth, that's the problem. We have the body. We know who the victim is. We can establish that he was alive on the evening of the eleventh, since several people remember him wandering around the streets late that night. One barkeep remembers running the kid out of his saloon because of his age, and Carlos has talked to a hooker who said she saw a man who resembled Young, cruising the area in an old, beat-up gray car. You told us Young was away from the institute that weekend. That'll help some, particularly if he can't satisfactorily account for his activities and whereabouts; but you must admit that the case against him is all circumstantial, and miserably weak at that."

"I know how it looks, Bud. But what I'm telling you is accurate. Young did it. You've got to dig deeper."

"How? Look, Ruth, I did what you asked me to do; I investigated your hunch. Now I've got another unsolved murder on my hands. That's all. We've spent a lot of your money and a lot of Carlos's time and this is all we've got to show for it. I don't even have enough on Young to pull him in for questioning. The instant I did that he'd just call his lawyer and his lawyer would come down and eat my lunch. You know that."

"Yes. I guess I do. Bud, if I finance the . . ."

"NO!"

Ruth looked at him in astonishment. Then her eyes dropped. For a moment June thought she might start crying again. He certainly didn't want that, but he was determined to be firm. From where he sat he was convinced the case was insoluble unless Ruth told all.

"All right, Bud."

"All right, what?"

"All right, get ready for a shock. My informant is my stepson, Adam."

"What?" Now the reason for Ruth's reluctance was crystal-clear to June. He almost felt sick at the thought he'd pushed her into this.

"T-that's not all of it, Bud. I'm almost afraid to tell you the rest. you're not going to believe me when I tell you how he knew."

"I've heard lots of wild stories in my time, Ruth. I'll try hard."

"You'd better. Adam knew because . . . because . . ."

"Go on, Ruth. Because why?" Having trespassed this far, he resolved to maintain his formal manner.

"Adam's a telepath. He read Young's mind."

June stiffened, sitting bolt upright in his chair, gripping the edge of his desk so tightly that his fingers blanched, the blood rushing to his head. He sat there, face flushed, mouth hanging open. Had Ruth really said "telepath"?

When finally Bud could speak, his voice was cracked. "Ruth, if it was anybody but you I'd send for the wagon, because they'd either be crazy or on something. But you believe this, don't you?"

"Yes, I do. It is a fact, Bud. I know how you feel. I went through the same sort of shock. I had the evidence thrust right into my face. I couldn't ignore it; neither can you. That same evidence is available for you to see and evaluate.

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"I think you can see now why I was reluctant to say anything about this."

"Well," June answered, drawing out the first word, "you're right about that."

"I know it must sound preposterous, Bud. But then, Adam's very existence once seemed that way to people. I know it once did to me. But I assure you his ability is real, and both Delmar and I are prepared to show you hard facts. What we're not prepared to do is to put Adam through the wringer of the American justice system again, if there's any reasonable alternative."

"Ruth, it still won't wash. Sure, I know that lots of people believe in that sort of thing. I know that a lot of those same people believe in UFOs with little green men in them, too. And I've got the feeling a substantial proportion of them have a few screws loose. I'd bet the ranch the average juror would think so, and if you're honest with yourself, you'll agree."

"I've done my duty, then, Bud." There was resignation in her voice. She rose from her chair and started to turn.

"Wait, Ruth. Don't leave."

"What's the point in staying?"

"The point is, Ruth, that while officially I have to be a skeptic, I personally would like you to tell me all about this. Who knows, the D.A. may change his mind."

"It'll all be off the record?"

"Off the record, Ruth, if that's the way you want it."

She returned to her chair and sat down. "Where shall I start?"

"How about taking it from the top? Tell me why you think Adam can read minds."

"O.K. I guess that's as good a place as any. I married Delmar about three months after his trial, and then I moved into his house with him and Adam. You don't really know somebody until you live with them, and that was the way it was with Adam.

"I had great difficulty understanding him at first, because he talked so strangely. I really had to listen carefully, and give him my full attention, to make out what he was trying to say.

"When I became his stepmother and could spend more time with him, I felt it was my obligation to do something about his handicap, so I tried to train his voice to speak more distinctly. I worked with him every day, and started recording the sessions on tape. Later we'd play the tapes back to see if he improved. Sure enough, he did. The time came when I had no difficulty whatsoever in understanding him.

"Then I noticed a strange thing. Though my understanding improved, other people's didn't, particularly if they were people Adam didn't know well. I mentioned this to Delmar.

"One night after Adam had gone to sleep and Delmar had some free time, I got the tapes out and I played them for him. We were shocked.

"There was nothing on the first few tapes but my voice, and a lot of gibberish. Oh, Adam made those sounds; that was clear enough. But the words, and I use the term loosely, were jumbled, out of order. Sometimes sounds were drawn out, and other times they were compressed. I had labeled the tapes, of course, so we had the dates, and I knew generally what we'd talked about on most of them. We could rule

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out mechanical problems, because my voice and all the background sounds came out loud and clear.

"We played tape after tape, starting with the oldest. The gibberish was still gibberish, but later tapes had less and less of it. Gradually Adam's voice disappeared from the tapes altogether, and except for my voice, they were blank. We couldn't understand it.

"Delmar said later that he formed the telepathic theory as soon as he observed the effect, but I had to wait until the next morning, when Adam awoke, before I managed to convince myself it really was happening.

"We all sat around the kitchen table, with the tape recorder in the middle. Every tape we played was perfectly understandable, including the blank ones —which weren't blank any more. Adam's voice came through clear as a bell, exactly the way I'd heard it originally. Even then we didn't say anything to Adam. Again we waited until he went to sleep, and we repeated the test. We were back to gibberish and blank spaces.

"I still have these tapes, Bud. I can repeat the experiment for you, if you like."

"I certainly would like, Ruth. But there must be more. Go on."

"There is more. You understand, Adam was—still is—a very young child. There wasn't much he could do to help explain it. We know now that at the time he didn't consider his power abnormal, didn't realize he was doing anything unusual. He assumed this was the way it worked for everybody, because he had no way to compare his own sensory apparatus to that of normal people. We tried to explain, but it was something like describing sight to a blind person, or trying to prove that the color you see as blue looks the same to me as it does to you. That's the way Delmar put it. He says the two systems produce comparable results, but they're too fundamentally different in operation for any valid comparison of the methods used.

"So we observed; and except for telling Dr. Blatchley, Delmar and I kept Adam's secret for several years. Meanwhile, there were some other developments that lead to the disclosure of this information to Dr. McKeever."

"I don't believe I know him, Ruth."

"He's not from around here. He came here from Atlanta. He's a neuropsychiatrist. Delmar and Mac went to school together in Switzerland, and were good friends. Delmar had a high regard for Mac's professional skills, too. So when it began to look like those skills might be needed, Delmar sent for him. It was supposed to be temporary, but after he got here and got involved in the research with Adam, Delmar asked him to stay. Now he works for the institute."

"How does this guy Young fit in?"

"Young's an engineer. His specialty is designing and building computerized medical analysis systems. I'll get to him later on in the story."

"O.K. Sorry about the interruption. Why did Delmar send for Dr. McKeever?"

"Well, Adam seemed to be developing somewhat abnormally, or what Delmar considered abnormally, and the changes which were taking place as Adam matured alarmed him. Delmar hadn't predicted anything like what was happening to Adam's head. He said that

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nothing he knew of in Adam's ancestry could account for them; that neither human nor chimp anatomy offered a clue to their cause. Eventually he decided that the effect was a product of the hybrid form, and he said that he needed Mac; it was too big a job to take on alone."

"What did these changes do to Adam?"

"They were deforming him. At least, from the human standpoint that's the way I'd characterize it; maybe from the chimp standpoint, too. If you've ever noticed, the chimpanzees have a sloping brow, and over the eyes they have ridges. Normal human skulls have a high domed shape.

"Adam has larger ridges than you and I do, but still not as big as chimps have. He has a much flatter dome. Delmar says that because Adam's brain will grow proportionately as large as any man's, he needs the dome to make room for it. And that's the way Delmar expected Adam to develop. But he didn't. Instead of moving frontward and up, Adam's brain seems to be expanding sideways, into what Delmar calls the temporals. This is starting to give his skull a sort of mushroom shape, and it's also enlarging the distance between his eyes. Adam always had poor eyesight, always had to wear glasses. This condition has made his visual problems worse, and that's part of the reason why Delmar hollered for help.

"When Dr. McKeever came he and Delmar tried to figure out what was happening to Adam, and that's when we told Mac about Adam's talent. After that, Mac and Delmar began studying Adam's brain in detail, trying to find out what was causing it to develop the way it was. Naturally, they suspected that Adam's talent was a product of that strange development."

"Was it?"

"That's what they believe now. Back then they still weren't certain.

"They claimed to be making some progress, but they were both impatient. By that time Mac was completely hooked on the research and had decided to give up his practice. Delmar was just as bad. He pretty much abandonend his other projects to work on this one. What they did next got Young into the act. This came about because Delmar controls all that money.

"You see, when Dr. Blatchley died, Delmar became director of the institute. The way Clarence's will sets up the trusts which fund the institute, Delmar has practically unlimited discretion about expenditures, which is reasonable, since some of Delmar's scientific discoveries have also been immensely profitable. Anyway, he and Mac decided they needed a specially built system to monitor Adam's bodily functions, one that could detect and analyze just about anything. Sort of a super CAT scanner, I believe that's the way they put it.

"Of course, such machinery didn't exist. So they went to General Electronics over in Los Angeles and explained exactly what they wanted it to do, and General Electronics undertook to create it on a cost plus fixed profit basis. I was against it, of course, since neither he nor Mac seem to have any sense about money. But they wanted it, so they got it.

"And you should see it. It looks like something out of Frankenstein's lab.

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They put you into this cradle on the top, and then the cradle goes down into this big tube. At each level there are instruments that scan a different part of your body until, when you get to the bottom, the computer knows enough about where everything is to make a life-sized, three-dimensional laser hologram. They can do all sorts of tricks with it.

"But it was so complex, so touchy, that they knew the two of them could never handle it. So for an extra fee they got Bickford Young, who designed it, as a part of the package."

"But Ruth, if he knows . . ."

"He doesn't. Adam says he thinks he'd be able to tell. I hope he's right. I'm afraid of what might happen if Young does find out. If he ever suspected Adam had telepathic ability he'd know his secret wasn't safe, and then Adam wouldn't be safe anymore, either. We've been careful. None of us have told Young what the experiment's real purpose is. He's been told its general purpose, which is to study Adam's growth. But he's not so stupid he couldn't figure the rest out, given enough time. That's why I want him away from there."

"O.K. I think I understand the background, Ruth. Tell me this: just how reliable is Adam's power?"

"Very reliable. When you've had a demonstration, I think you'll agree. Of course, you and I are laymen; Delmar and Mac understand this better. But even as a layman I'd have to say that you can't tell the difference when Adam is conversing with someone he knows well. When it's Delmar or I, none of us needs to vocalize anymore, though we commonly do for safety's sake. It wouldn't do to have an outsider notice that Adam's lips don't move when he speaks."

"Vocalize? Does that mean Young had to talk about what he was thinking before Adam could hear him?"

"No. Though it's possible he did do that.

"You see, in situations other than regular conversation there seem to be limitations. Distance seems to be one of these. And Adam says he can't always get into a head, even close by. Other times he's limited in what he can learn, because the mind he enters has to call up a thought before it's accessible to Adam. He can't get into deep memories unless the person he's observing is consciously recalling them. Adam thinks this has to do with the human habit of thinking in words, because when somebody vocalizes his thoughts it makes reading easier.

"Also, Adam's convinced the ability is one-sided; other people don't possess it to any appreciable degree, while he seems to be both a strong transmitter and receiver.

"Want to hear something really strange? This is not unique to man. According to Adam, the average ape has greater ability in that direction than the average man does, and among the apes it's strongest in chimps. Now that is an interesting revelation, isn't it?"

"I don't know as I'm particularly flattered, Ruth. Uh, back to Young; I take it Adam detected Young thinking about his crime. Is that it?"

"Yes. And that's the really frustrating part."

"What do you mean?"

"Young's never done so again since

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the night it happened—according to Adam, not once. That's why details are so sketchy. Adam had been asleep for part of the time Young was thinking about it. He woke because he heard the dogs bark when Young returned to the institute. He looked out his window and saw Young get out of a cab way out by the gate, and he was curious as to who it was, and why the cab didn't come into the compound. Then, suddenly, he picked up what he describes as extremely strong but fragmented thoughts. That's when he realized that Young had killed somebody and that he had buried the body. But he couldn't make out very many of the details, because of Young's chaotic state of mind. He said things 'bounced' around too much.

"Right after that Young went into his room and took a sedative, which knocked him flat a few minutes later. Adam doesn't know why, but he says Young simply can't recall committing the crime anymore."

"Can't, or won't?"

"Adam doesn't know. He's considered the possibility that Young's just not a strong enough emitter to come through except in times of stress, or that it may be some sort of unconscious block. He's never before met anybody who could block purposely and he's certain that isn't what Young is doing. He says he simply doesn't know enough about his power to make a judgment about what's happening in this situation."

"How old is Adam now, Ruth?"

"Eleven."

"Well, I'd say that for a kid that age, his judgment's pretty good already. Maybe good enough so that he deserves a chance."

"You mean it. . . ?"

"I mean, maybe the D.A. has gotten interested again. Of course, I'm going to have to make some judgments myself. I want a demonstration, Ruth."

"You've got it, Bud. Why don't you come over for dinner tonight. I'm sure that Delmar and Mac can tell you a lot more than I have. Uh—but remember, I still want to avoid exposing Adam to the publicity."

"Ruth, I hesitate to bring this up, but you've never said whether or not Adam knows you've been to see me. Does he?"

"Yes. I can't keep a secret from him. He knows me too well. I'm not sure he appreciates what the full implication would be if this case had to go to trial and he had to testify; but I do, and that's why I want to avoid that if I can."

"What time is dinner?"

"Come about seven."

The analysis lab was housed in a dome which lay about halfway between Dr. Schoonover's house and the greenhouse where Dr. Wellington Smith carried on her horticultural experiments.

Carlos Colina parked his unmarked car in front of it and switched off the power. Gus Rios, the other deputy, took handcuffs out of the glove compartment and slipped them into his jacket pocket.

Then the two got out of the car and entered the building, passing through a set of double doors which opened automatically. Inside it appeared to be one huge room almost fifty feet from floor to ceiling, the center occupied by a huge and complex structure studded with dials and flashing lights. Near its top was some kind of cradle mounted on a

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gimbals, into which a figure was strapped. It wore a strangely shaped helmet from which hundreds of tiny wires protruded and came together in bundles running into the frame. The figure's arms, legs, and torso were bare and they too were attached to the machinery, though some of the attachments were not wires, but tiny tubes. It looked uncomfortable.

Colina realized he was looking at Adam Schoonover. He had never seen Adam in person before, but he had, of course, seen pictures of him, all made a long time ago. He told himself it was impolite to stare, but he stared anyway until his attention was attracted to a man who approached from behind the machine.

The man was big, well over six feet, and his weight was proportional. He looked like a piano mover, but he wore the familiar white lab jacket Colina associated with the medical profession. It was open at the neck, revealing a profusely hairy upper chest that seemed to go along with the rest of the man's giant features. The man wore thick glasses and cocked his head forward, as if trying to get a better look at the two strangers as he approached. Colina could see two other men behind him, peering out from the far side of the machine.

The big man spoke, in a voice unexpectedly high in pitch. "Can I help you?"

"We're looking for Mr. Bickford Young. Is he here?"

"I'm Bickford Young."

Colina reached into his inside pocket and pulled out the leather folder containing his badge and I.D. He held it up so Young could see. "I'm Carlos Colina, from the D.A.'s office. This is Deputy Gus Rios. We're here to serve a warrant on you. You're under arrest."

Colina again reached inside his jacket. He drew out a paper, which he handed to Young. Young took it and started to read it, even as Deputy Rios began reciting the Miranda warnings.

"*Murder!* Are you people insane? I never heard of Milenko Vukovich!"

"Yes you have, Mr. Young. You broke his neck on August 12th and buried him out on the Mitchell spread. Then you got rid of the car and came back here in a cab."

"I don't have a car. I haven't owned a car in five years."

"Then tell me, Mr. Young: if you didn't kill Vukovich, where were you that night?"

"I think I'd better stop talking to you until I've seen a lawyer. I'm not saying anything else."

"That's your constitutional right, Mr. Young. Now, turn around; put your hands behind you."

Young obeyed, and Rios cuffed him. Then they led him away.

As soon as the three drove off in the squad car, Schoonover and McKeever came out from behind the machine. Delmar scrambled up the ladder and began removing the wires and tubes from Adam's body.

Adam waited patiently to be released, and as soon as his arms were free he began unhitching the straps which held him into the cradle. Then they descended, Delmar first and Adam close behind. McKeever was waiting for them at the foot of the ladder with Ruth and Bud June, who had entered in the meantime.

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"Did you get anything, Adam?"

"Some, Mr. June. He is lying. He did kill the boy, but he did not know the boy's name when he did it. But he is not lying when he says he does not own a car. The car belongs to another man, called Elizar. I think that is a first name. Mr. Young took the car back to Elizar's house and left it there."

"Do you know where Elizar lives, Adam?"

"There was no number on the house, Mr. June, and it was dark. Mr. Young did not pass any signs that he recalled. But there were two big tanks across the street from the house."

"Good. What else can you tell us about that night?"

"I am now sure about the unconscious block, but it didn't come on right away. There were bunches of thoughts: thoughts that jumped around a lot. I think this was because he was so surprised at first to find out someone knew. Afterward, it was like he was trying to make himself believe none of it was true, and it became very hard to see. But I did find out some things. I know that a girl saw him with the dead boy. Mr. Young seemed very upset when he thought of that because he believes this is how the police found out what he did."

"Do you know where she saw them, Adam?"

"On the street, when the boy was getting into the car. But I don't know what street, and Mr. Young does not remember much about the woman, except that he did not like her kind."

"What about the car, Adam. Do you know what make it was, what color it was?"

"It was old. It was a gasoline car; not an electric. And I think it was gray. The inside was all torn up."

"What about the murder itself, Adam? Did Young think about that?"

"At first he did; he remembered fighting, and stopping the car, but none of this is very clear to me. He skipped around a lot, and he did not think whole thoughts. I have to put the pieces together to understand them, and this is very hard."

"I know it must be, Adam. Believe me, I appreciate the fact that you've tried. And if you remember anything else I want you to tell me, O.K.?"

"It doesn't work that way with me, Mr. June. Either I know or I don't. I have already told you everything."

"Uh, Mr. June," Delmar broke in. "We have to do some things for Adam, now that he's down from the analyzer. He can't talk anymore until we're finished. O.K.?"

June nodded, and the three marched off together, leaving June and Ruth alone.

"Not good enough, is it, Bud?"

"Not quite; not yet. I was really hoping Young would panic and turn loose of everything. But it's obvious that he didn't. We're going to have to do this the hard way."

"It'll be a couple of days before he can get an examining trial set up. What did you recommend as bail?"

"I recommended no bail, but he'll get it anyway from some bleeding heart, probably our old friend Paula Whittle. Everybody heads for her court when I do this. She just loves to sign writs."

"What're you going to do now, Bud?"

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"Find the car, I hope. The tanks should narrow the search down some, and Elizar's not all that common a first name. The woman will be lots harder. She's probably a streetwalker someplace down by the harbor. Young probably regarded her as the competition. I just wish we had more time for all this."

"Yes," said Ruth. "That would have helped. I personally thought this would have more shock effect on Young than it did, but he seems to be a cool hand. Delmar says he's absolutely brilliant with these gadgets they use, and if it wasn't for his other bad habits he'd probably want to keep him around. Which brings up another question: what if he does get out on bail and comes back here? What do we do then?"

"Good question. I suppose you could kick him out."

"He'd sue us, or General Electronics would. And if the prosecution didn't work out he'd probably win. The charges are only an accusation at this point. A conviction might justify firing him, but the simple fact of his arrest won't."

"Consider the alternative, Ruth. If he came back here, and if he ever got wind of Adam's involvement, he might just decide to eliminate our witness. He's killed before for less reason."

"I have considered it. It scares the pants off me. And the fact that Young's as bright as he is doesn't help any. I'm sure he knows that Delmar and Mac aren't doing all these brain scans, with all this super expensive equipment, just for fun. Even an untrained person can sense the alien characteristics Adam has, and as soon as Young finds out how little evidence you actually have he'll start wondering how you got that far. It isn't so much of a presumption to connect that situation with the possibility of psionic eavesdropping."

"Do you want protection, Ruth? I could put a couple of men out here."

"I'm not sure that wouldn't just make things worse, Bud. I think Adam's best protection would be for us to see that Young stays locked up."

"You know I'll do the best I can, Ruth."

June's best was not quite good enough. When Ruth heard that bail had been set at $100,000 she was afraid Young might be able to find somebody to cover it, and she was encouraged when he didn't even try.

But he'd had a reason. His lawyer, Percy Schaeffer, had moved immediately for an examining trial, and he'd gotten one in less than two days following Young's arrest. Ordinarily such trials were pretty much a waste of time, because in the interim the D.A. usually presented the case to the grand jury, which wiped out the right to a hearing to determine probable cause to hold the defendant for trial.

As things developed, the State couldn't satisfy the Justice with the evidence they presented that there was a connection between Young and the deceased. Consequently the complaint was dismissed, and Young was released.

The justice's dismissal of the complaint didn't bar the charge; it merely removed the State's right to hold him in jail. Young could still be indicted, even now. All it would take was more evidence. Bud didn't have it, and he didn't feel like taking another fall by

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showing them the same stuff the J.P. had seen. They'd "no bill" it.

What worried the D.A. now was that the clock was ticking against the State because of the Speedy Trial Act, particularly since there had been several recent decisions adverse to the State where that act was concerned. He began to regret his hasty action in having Young picked up. Had there been no arrest there would have been no problem, but since the arrest had initiated Young's prosecution, he was effectively under the 120-day deadline. He had to get Young re-arrested and be ready for trial before the time ran out.

Young returned to his old quarters at the institute and resumed his duties.

True to her word, Ruth and the others behaved outwardly as they always had, whenever Young was around. But they made a rule and adhered to it rigidly: Adam was never to be left alone with the man. At night he slept behind locked doors, guarded by Felix Juarez, a deputy Bud had assigned for that purpose who masqueraded as a houseman.

Neither Delmar nor Mac thought that adequate, and armed themselves as well. Ruth was against this. She didn't know about Mac, but she knew Delmar, and she had no confidence whatsoever in his ability to hit anybody but himself.

Time passed. Bud's office had nothing but discouraging news for the Schoonovers. Elizar was gone. It developed he had been a *mojado*, or wetback; an illegal immigrant who'd subsequently disappeared, along with his car, probably across the border from whence he had come. The police despaired of ever locating either.

They had better luck with the hooker. She was located, though she was of little help to them. She had gotten a good look at the victim, and described him with fair accuracy. He'd been outside the car, and she had been attempting to attract his attention. She had had less opportunity to observe the driver, who had stayed inside the car. She tried, but she wasn't able to pick Young's picture out of the mugbooks.

So the prosecution found itself stymied again. There was still no one who could put Young and his victim together, much less at the crucial time. And there was even less time left to make out a case.

In order not to alarm Adam, the four adults met again late at night, after he was asleep. Their purpose was to decide whether or not to take the next logical step: to let the grand jury hear the story from Adam.

Delmar Schoonover sat next to Ruth on the den's small couch. Mac, with his usual can of beer in his hand, sat on the bear rug next to the coffee table, and Bud, for once informal and dressed casually, reposed in the big overstuffed chair which was Adam's favorite when he was in the den.

"I don't like it, Bud," said Delmar. "It'll stir everything up again, just like it was when Adam was younger. I'm not anxious to see my son persecuted again. It was bad enough the last time, when people only had physical differences to complain about. They called him a monster, even back then, and people like Lester Rothals will regard Adam's powers as proof that he was right. You do remember the 'Reverend' Rothals?"

"Yes, of course I do," June replied.

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"Then you'll also remember what he called Adam: He called him the Antichrist; built a whole religious cult on my little boy's back and tried his best to make the whole world hate him. There was a time, not so long ago, when you couldn't turn on your TV without seeing his ugly face and hearing him say that."

"Rothals is about out of business, now, Delmar. He got his start, made his pile, and settled down to the life of a tycoon. Right now he has his hands full with the IRS, trying to keep them from putting him in jail for tax evasion. I doubt he'll cause Adam much trouble."

"Maybe *he* won't, but there's always somebody looking for profit in other people's misery. The world is full of that type. I know; I went through a criminal prosecution. Bud, I've been in jail not because I was guilty of anything, but because some loudmouth busybody reporter wanted to sell papers. If the government can imprison innocent people, why can't they lock up somebody we all know is guilty? Why does Adam have to get on the witness stand and take the abuse we know the world is going to give him? He . . ."

"Delmar, I know how you feel and believe me . . ."

"No! You don't, Bud. And don't interrupt me, O.K.? Because I'm not finished.

"Adam doesn't owe the world one blessed thing. All he ever got from it was grief. The world has rejected him, along with his kind, for no other reason than that he's different from other people. The same government that put me in jail now expects my son to go to court in the name of justice—the same government that won't do justice for him by allowing him to have a mate. The same legislature which forbade murder also forbids me to repeat my process and create one for him, under pain of imprisonment. Is that just?"

"Delmar, you have to understand . . ."

"NO! I don't HAVE to understand, Bud. For the edification of yourself, and anybody else who thinks I HAVE to, I'll frankly admit that I not only don't now, but am not sure I ever will, understand a system that can take such inconsistent positions on what amounts to the same issue.

"And it's not that I never tried; I *did* try, for a long time. I listened to Ruth, because I know she loves me and I know she loves Adam. I followed her advice. I turned the other cheek, and I did what she suggested, because I was convinced she knew best, that she understood the system. And we lived here quietly, trying to make the best of things, minding our own business.

"And what happens? An outsider, somebody we have no control over when he's off duty, goes off someplace, and for reasons of his own commits a crime totally unconnected to his work and completely unrelated to any of us, and then comes back and dumps his guilt in my son's lap.

"Adam didn't know what to do. How could he? Adam's an innocent little kid. All he knew was that killing was wrong, and he thought we ought to be told that Young was a murderer, so he told us.

"And then Ruth, who for some obscure reason seems to think you're her friend, tells *you*, because she considered

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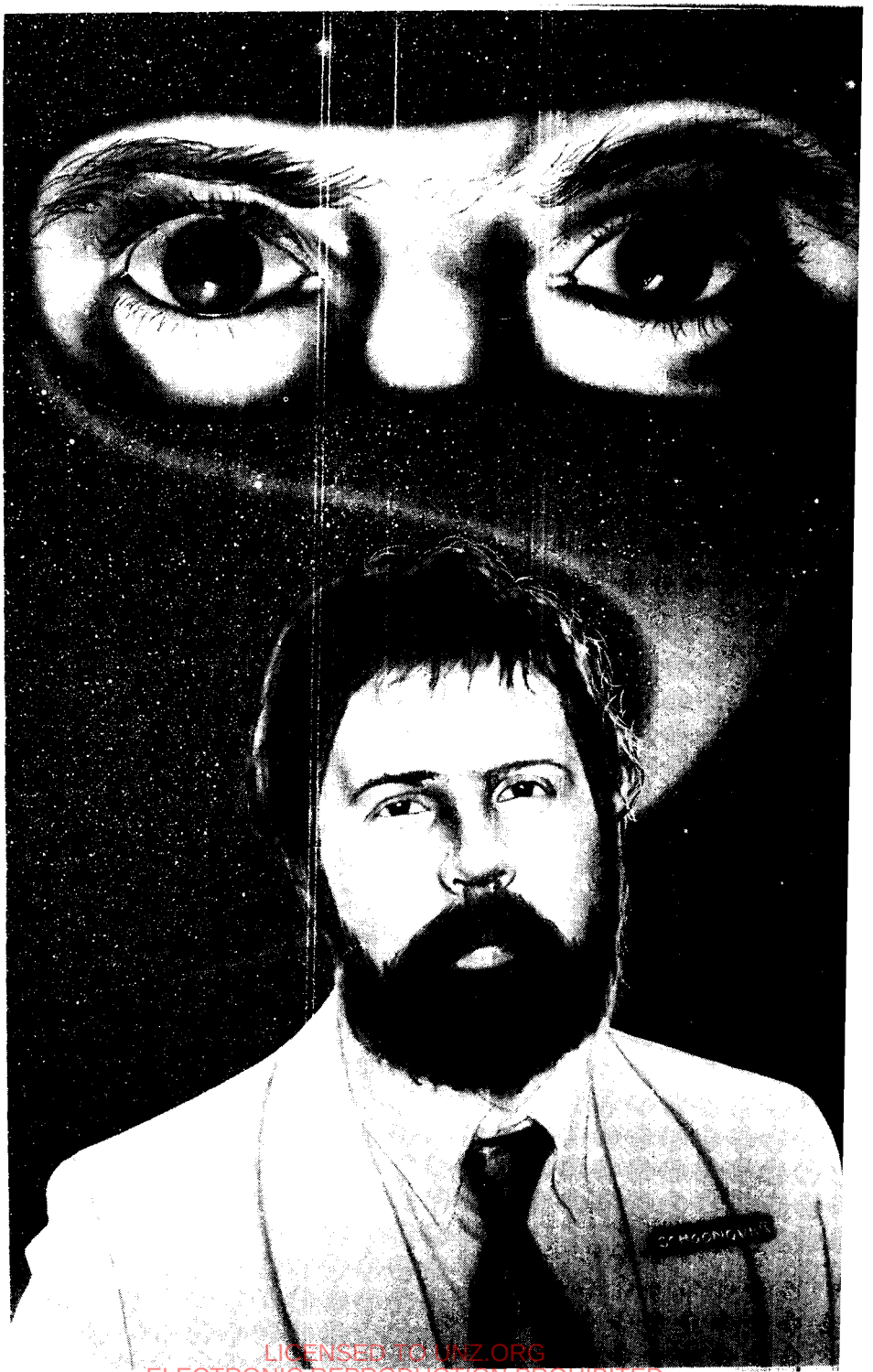

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that her duty, and she thought she knew best.

"I didn't think so; not that time. I was against it because I was afraid that what *did* happen, would happen. I wanted to just ease Young on out of here and end his involvement with the institute quietly; let him take his problem away with him. I should have followed my instincts.

"But I didn't. Instead, I compounded the mistake by listening to a lot of fancy talk about law and justice, and I let myself get talked into this mess.

"Well, it's time to stop this foolishness, and I intend to. If the law can't do the job with what Adam's already given it, that's tough. Because the law's got all they're ever going to get from my son."

Neither June nor Ruth had ever seen this Delmar Schoonover: a red-faced, adamantly serious, angry Delmar Schoonover. The insipid, pliable, totally rational Delmar was momentarily gone, in his place something new and uncommonly fierce.

The change, in June's opinion, probably wouldn't last. Such ire was seldom permanent; people always reverted to type. Delmar would too, but perhaps not before the tempest rose a little higher, as June knew it would when he said what he had to say next.

He said it: "Delmar, the State needs Adam's testimony. Without it we can never bring Young to trial. Even with it we may not be able to get a conviction—but we must try. And the State CAN force the issue, Delmar. It CAN punish anybody who tries to interfere with the production of that testimony.

"I'm personally very sorry that this is the way it turned out, but that's the way things are. There isn't anything that any of us can do about that."

Delmar had risen from his seat. He stood a moment without taking a step, but turned slowly to glare at the others, each in turn. Then he said, "No, this is NOT the way things will be," and stomped out of the room.

"I've never seen him like this before," Ruth said. She also rose and took a step or two toward the door.

McKeever stopped her. "I have, a long time ago. Stay, Ruth. You can't help him."

She stopped.

McKeever motioned her back to her seat. "I knew Delmar a long time before you did, Ruth, when we were both pretty young. He had an ungovernable temper, and it used to get him into lots of trouble. You'd probably never picture him as a brawler, but he was. One time he got into it with a French cab driver and almost killed him in a fight over the fare. That was when he changed. He took, and kept, control over his temper. He actually overdoes it, so there are those who assume he doesn't have one. I assure you nothing could be farther from the truth. Take my advice and leave him alone for a while."

"I guess that's good advice, Mac. It's just that I don't want this thing to break up our home, and it looks like that might happen if Bud won't back down."

"I'm sorry," June replied. "That's not a consequence I'd be proud to bring about, and I hope it'll never happen. But I'm stuck, Ruth. You know I'm stuck. There's no way for me to go with the case but forward. None of us have

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any real choice anymore, if we ever did."

"It's not a violation of your oath to refuse to prosecute a hopeless case, Bud."

"No. Not if it really is hopeless. The trouble is, I can't tell yet, and any attempt to find out may do exactly the damage Delmar fears."

"Suppose," said Ruth, "Adam did testify, and relate the facts he knows. If he said he 'heard,' who'd ever question it? Who'd ever dream he wasn't talking about the normal type of hearing?"

"We'd never get away with it, Ruth. There'd be a motion to suppress, and a hearing on that. Young wouldn't waive his immunity by doing it, so there'd be no reason for him not to take the stand and testify Adam was nowhere within earshot. We'd have to rebut that some way, and we couldn't. No, we can't go in with a smelly case. It has to be the real thing. We've got most of that already. It's Adam's testimony about what he overheard that's really crucial.

"Right now we can prove a homicide, we can maybe put Young in the pickup area, and we can prove the time death occurred. All we need is corroboration of our circumstantial case —which Adam can supply, if he testifies to Young's 'confession.' That should be enough to pull the jury over to our side on the reasonable doubt issue. The thing that'll cause the problem is explaining how Adam knows. We can't count on Delmar. That leaves Mac," he said, turning to the neuropsychiatrist, "and I have to know whether or not you can do it. If you can't, or if it looks like the jury couldn't possibly buy the telepathy story, then there's no reason to put Adam through this."

Ruth recognized his implication. Bud was passing the buck. If Mac said "no," that was probably the end of it. Nobody goes to trial and relies on an expert witness who won't commit himself.

It was evident that Mac was busy struggling with his conscience, because he took a long time to reply. The others could almost see the wheels turning in his head.

In the end, conscience won out. Mac uttered a clear and unequivocal "yes."

Ruth felt her heart leap into her throat.

"O.K.," said June. "Next question: can you back your explanation with any kind of scientific proof?"

"Yes."

Ruth regained enough self-control to raise a question. Her tone suggested she was still looking for a way out. "What about the Fourth Amendment? Or the Fifth and Fourteenth, for that matter?"

"What about them?"

"You'll be up against a long line of adverse decisions: *Texas* v. *Gonzales*, for instance; *Cady* v. *Dombrowski*, *Katz* v. *U.S.*, maybe. I'll bet I could find you a hundred more you wouldn't like."

"This is a case of first impression, Ruth. None of those courts ever ruled on mind-reading; therefore none of the precedents apply. Our position will be that Adam's an informer, who happened to overhear a man confess to murder. It shouldn't matter one bit that Young didn't know that was happening."

"The test is reasonableness, Bud. If a person has a reasonable right to expect

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his thoughts are confidential, and Young has, then any intrusion is illegal, and the confession inadmissible."

"Yes, but you're forgetting something, Ruth; the fact that Young might have considered telepathy impossible is no reason to throw it out. If, for instance, somebody had confessed to murder on Edison's phonograph before he knew the device would record his voice, would that stop the court from letting it in? I'll take that risk, Ruth, and I'll bet the theory makes it. But it all depends on Mac, so let's get back to him.

"How about it, Mac? How does this telepathy thing work?"

"You want my theory?"

"I'll take anybody's theory, as long as it sounds plausible. You might start by explaining, why Adam?"

"Why not? Or why anybody, for that matter? I have no reason to believe that Adam's the only telepath who ever lived, but he is the only one I've had any experience with. And he's the only reason I'm convinced the phenomenon can be scientifically explained."

"Don't get melodramatic, Mac."

"Sorry. It just seemed to me that since we have a flesh-and-blood example that people can see and who can give a demonstration, if necessary, proving the fact of telepathy is the easy part. Its accuracy—that's another matter."

"Then we'll concentrate on establishing that."

"O.K. Here's the way I suggest we approach that part of it.

"We all know that thousands of people have claimed to have the power in the past and that many still do today, despite the lack of any scientific proof and the serious investigations of people like Rhine.

"In every instance I ever heard of, even the person who claims to have the power freely admits it isn't reliable —except one: Adam's ability is unique in that respect."

"Ah . . . I see why that bothers you," said Bud. "All the nuts who've gone before have muddied up the waters."

Mac grunted his agreement. "Some of these people claim that scientific prejudice prevents serious study of telepathy. That's simply not true, since no such prejudices exist among the Lamas of Tibet and other such groups, who certainly would have no inclination to despise psychic research. As a matter of fact some of these very people have provided highly professional reports of observations of the phenomena.

"Again, since we know it does exist, I'd simply suggest that in the overwhelming mass of cases telepathy is inherently unreliable—in *Homo sapiens*. Adam's case is different; and it's my opinion, from what I know of his power, that reliable telepathy would be the norm for his species, because it represents the only means of higher communication."

"Well, you sound convincing so far, Mac. Don't talk yourself into a corner now."

"You have to consider the point, Bud. It's a strong one. How could Adam use it if it wasn't reliable?"

"Then you'd better be able to explain the difference."

"I can. Consider: Adam shares his heredity with no one. Not completely. Not with his chimp forebears, not with Delmar. That's evident in his physical

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development. It's clear that Delmar's manipulation changed more than he thought it would."

Noting the puzzled looks which washed over the faces of his companions, Mac paused. "Let me explain that. Consider two strange things: man on the one side, who talks; cousin chimp on the other, who doesn't. Each has a large brain. Each has a fully formed larynx, and each has the requisite oral mechanisms. There is no apparent physiological reason why chimps don't talk. It isn't because they can't form the sounds. They *can;* a few of them have even managed to utter words.

"Back in the early '50s a chimp named Vicki was raised in a controlled environment and taught three words: 'mama,' 'papa,' and 'cup.' She could pronounce these words distinctly. She could also utter other vocal sounds, both vowels and consonants, but these were too indistinct to equate with any human words. This pretty well destroyed the theory that they can't make the sounds. When you consider that even dogs, with much less similarity in physical structure, can be taught to parrot human words well enough to be understood, that's a pretty miserable performance for a chimp.

"However, if you look at the results of studies made of attempts to communicate visually with symbols, the chimps did a lot better, and there's no question they have the intelligence to communicate. So there has to be another reason why they don't talk. Thanks to Adam, I know what that is."

"Then tell us, just like you're going to tell the jury. And remember, Mac, juries do some weird things. You can never tell what they're up to. And I think you've got a contradiction already. Ruth told me that when Adam was a baby he had operations on his mouth so he could talk. What were they for?"

"Ah yes. That should have been a clue, but you have to remember, less was known in those days. Delmar was afraid that, left alone, Adam would not have been able to speak, because certain motor nerves were different; deviated from the human configurations and connections. These were surgically relocated; a most delicate job, but useless. We know now that the problem was on the other end—that Adam couldn't, and never can, use speech the way we do. His communication is entirely telepathic."

"Yeah, well, Mac, we have to really watch that kind of stuff. This whole thing is going to have a bad enough effect on the jury. I mean, when they get the idea that he can look into their heads and . . . well, there's no telling how they'll feel about it."

"Then you'll just have to ask the right questions, Bud; listen to me, so you'll know how. I said I can give you a good, solid scientific explanation for the ability, and I will."

"O.K., so go ahead; prime the pump."

"Right. I was about to call attention to Adam's physical appearance. That's another clue; probably a characteristic of his species, and one that marks him as different from both the *sapiens* and *pan* lines.

"In the adolescent Adam we've seen some really peculiar cranial development. It's not so much a matter of brain volume and weight as it is distribution. He does possess a substantial forebrain,

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as we do, but its position within the cranial cavity is different. And in contrast to man he does not have the high cranial vault.

"The reason he doesn't is that, in his case, his body is programmed for extensive development of the temporal lobes. To make room for them, his skull has expanded laterally and is relatively flat.

"For a long time, Delmar and I were very much concerned about that, because we had no way of knowing if this was normal or some kind of deformity. We had nothing to compare it with.

"But when we got the analyzer and really went to work and started a neurological mapping of Adam's brain, we found a number of interesting things.

"First of all, the cranial arteries were greatly enlarged in the temporal region. The cortex was also abnormally thick in the same area, and there were significant differences in the size, placement, and development of the thlamus."

"Uh, Mac, those big words; you'll have to be careful throwing them at jurors."

"We can take care of that when the time comes, Bud. In the meantime, are you following me?"

"Yes, so far."

"Good; let me go on then. We couldn't begin to explain these findings until we could precisely locate Adam's sensory centers. Then we knew we had it.

"As soon as we could identify sensory pathways, we traced them, and this is where the astonishing part comes in. The bulk of them led to, of all places, the limbic lobe. Adam's limbic system is unbelievably different from Delmar's and mine—we used ourselves as control subjects. His is richly endowed with nerve bundles, almost all of which cross-connect with specific areas of the temporal. When we found this we knew immediately that we were dealing with an entirely new concnept of sensory processing.

"One more observation of significance, then I'll go on to the practical consequences of this. There were no discernible connections from the areas of the brain which, in human beings, carry sound impressions to the frontal cortex. Absolutely none.

"This meant that when Adam heard words spoken he had no way of interpreting their meaning, because that is a function of the forebrain. Nor would he be capable of uttering intelligible words, not without feedback. Sounds, yes, but not words, because he lacks the means of putting words together."

"Uh—question, Mac. If Adam doesn't recognize the meanings of sound, how can he keep from getting hurt? I mean, supose he was crossing the street or something; would he pay any attention to an automobile horn or something like that?"

"Oh, sure. But that's not the same thing. It doesn't require the same degree of sophistication. Speech is incredibly complex, perhaps more complex than telepathy. Almost half of the human brain is involved in dealing with it. Adam has simple links with the forebrain to handle simple sounds, though even these aren't really necesary. In Adam's case, as in ours, the prebrain is adequate to do it. The forebrain doesn't usually get involved with survival reactions. It'd take too long, for

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one thing. And most of the time they're no more involved than, say, moving your hand off a hot object; simple reflexes, you see.

"Anyway, all this fits right in with one of the theories which have been advanced to explain why apes don't use speech: the so-called limbic theory, which our results suggest is correct. The theory assumed what we found to be fact in Adam's case: that chimps channeled all sensory impressions into the limbic system, which in apes would be poorly equipped to handle them. The limbic lobe was supposed to be the situs of emotion, which meant that chimps would always be too distracted by emotional overlay to formulate and use speech. It was also assumed to be isolated timewise, bound to the present so tightly that before the apes could formulate the words they would forget why they wanted to say them. That's a crude way to put it, but I think it's essentially what would happen if Adam didn't have some compensating systems."

"It doesn't work that way with Adam?"

"No. Adam's system solves the memory problem by massive neural connections with the temporal, which we know serves to store memories in *Homo sapiens*. The neural cross-connections I mentioned a minute ago enable him to shunt data back and forth between storage and what pathways into the forebrain he does have. It works the same way a computer does, but incredibly faster when you consider the input Adam must deal with.

"So much for the neurological background; let's get into the way Adam uses his mind."

"Good," said June. "That's the part that's crucial. This is what the jury will have to know. They don't care about the other stuff."

"No, but you should. Once the defendant finds out what your theory is, he'll have his own experts all over you. I know how that works. I've been there."

"O.K., how does he do it?"

"Essentially the same way you do. Only the medium is different. In fact, you could say the same thing about all the higher animals. They all convey information in three basic ways: bodily displays, gestures, and sounds. Man uses all three. So do apes. But man has taken sound communication one step further, and it was a wise move. Because, properly handled, nothing beats speech. —Except maybe telepathy, of course.

"The evidence suggests that the chimps are about to take a further step, too. Adam says that he can detect weak emanations in them. And it may well be that the chimps' ancestors had begun to commit themselves evolutionally in this direction. They got stuck there, just as man is stuck with speech. Neither species can change course, now that commitments have been made. Once committed, the only choices are further development or stagnation.

"Fate seems to have put our kind in the lead. We advanced; *pan* stagnated. Had it not been for the rise and the dominance of man as speech user, chimps might have gone on evolving into something like Adam is today; but they were a day late, so to speak. And because direct competition with man would have led to extinction, the chimps retreated

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into areas where that was avoided and thus have survived."

"What's that got to do with Young's prosecution?"

"Everything. Adam is different from both modern man and modern chimp, though there's no question he shares the nature of both. This is fortunate. There seems to have been some evolutional crossover; modern man seems to have a tinge of telepathic ability, enough so that he is a relatively weak emitter and an even worse receiver. If he wasn't, Adam would be completely alone. And if he wasn't, he couldn't confess to murder to a telepath."

"Doesn't that imply that anybody can do what Adam does?"

"No, not at all. What I mean is that there's apparently some medium through which thought can travel from one mind to another; and that every mind, in the act of thinking, radiates. You and I don't have powerful enough apparatus to do anything useful with the effect. Adam does.

"Adam picks up these weak emanations, which he says accompany all vocalizations. That's the way he listens. If he wants to reply, his mind then calls up files from his temporal storage areas, matches the thought pattern to the standard patterns of sounds which experience has taught him equate with human words, and broadcasts his reply. He does not think, by the way, that these 'essences,' as he calls them, correspond accurately, but that they are simple codes which trigger recognition in human brain cells. So what he really does is make use of the recipient's own data."

"That sounds like a hot area, Mac. I don't think you ought to say it that way. It sounds too much like Adam can tell people what to think."

"Hm. Yes, I can see your point. However, that's not what happens, and as far as reception is concerned there's no such mechanism operating anyhow. That works differently, and it's all under the control of the thinker. And the thinker's strength varies somewhat with his emotional state. That's why, on occasion—like with Young—Adam can pick up emanations sufficiently high in quality to be interpreted even if the other party doesn't vocalize. These may be during periods of extreme anxiety, fright, anguish, or danger. All of these, by the way, are commonly associated with telepathic experiences in human beings."

"Well, that'll be a relief to the jury. They'll be pleased to know that Adam can't just muscle his way into somebody's mind. As I said, I think that would go down badly with them. Now they won't worry so much about him getting into theirs."

"Adam's still developing; so is his power. Someday he may be able to do just that. And telepathy may not be its only facet. In spite of the fact that we know he's a telepath, and we know the anatomical situs of the faculty, we still don't know how the actual transmission takes place. There's no way to detect the emanations except with another mind. For all we know, they may be routed through an adjoining universe.

"Well, there you have it: the McKeever theory of telepathic function."

June did not respond. And, having gotten what he wanted, he left a short time later.

Mac and Ruth, each wondering if

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they'd followed the correct course, said "goodnight" and went their separate ways.

Felix Juarez was having his favorite dream: the one where he stood there, resplendent in his dress uniform, while that cute waitress from Rosa's Cantina climbed into his new Mallory Super-KW to go for a ride on the beach.

This was as far as he had ever gotten. Somehow, something always interfered. Usually it was the alarm clock, but this time it was a hand; Dr. McKeever's.

Felix opened his eyes, recognized the doctor in the dim pre-dawn light, and started to rise.

"Get dressed, quickly. Get your gun and follow me."

"What's happening?"

"You'll see. Just do what I tell you, and only what I tell you."

Felix grabbed his pants and boots, but didn't bother with his shirt. He reached into a dresser drawer and got the long-barreled .38 he ordinarily wore in uniform, leaving behind the snub-nosed job he'd been carrying on this case.

McKeever led him out the door and down the gravel path toward the dome-shaped lab building. Felix could see lights shining through the skylight, and wondered why they were on, since it was obviously not quite dawn. He could also see that Dr. Schoonover was waiting for them behind a stack of crates just outside the door.

They approached quicky and joined him.

"I'm ready, Mac. So's Adam. He's inside." Dr. Schoonover had a gun in his hand.

"Dr. Schoonover, what are we doing here?"

"Setting a trap, Felix. Now, get your gun out and be ready to go inside the lab."

Felix took that to mean *right now*, and he was ready to charge in immediately.

Schoonover restrained him. "Not just yet, Felix. Wait. Listen."

Felix did. After a moment he said, "I don't hear anything, Dr. Schoonover."

"Shh. Stay where you are until we tell you to go in. Please!"

A voice boomed out. At the time, it had sounded to Felix as though it was coming through the P.A. system—as, in fact, part of it was: Young's voice, loud, clear, and angry. And, at the time, Felix had thought he had heard Adam, too; a not unnatural assumption, since he could see the speaker perched over the door, silhouetted against the rising sun. It was only later, after it was all over, that he learned Adam's voice had all been in his mind.

"Who's that?" Young roared.

"Adam Schoonover. I'm up here—look, up on the analyzer."

"Are you crazy? What are you doing here?"

"I came to see you."

"Why?"

"To ask you why you killed Milenko Vukovich."

"Hasn't that thing gone far enough? I'm sick of hearing about it."

"You haven't heard the good part; I know you killed him—and I watched you bury him."

"What? Get down from there."

"No. You'll break my neck, just like

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you did his. You enjoyed it, didn't you. You like to kill. You know how I know that? I'm reading your mind. I can tell you every move you made that night, and when you made it, and who saw you. All the other people who saw you besides me; I know about them. There was that hooker, and the guy at the red light up on Navigation Boulevard. He saw you right after the fight started: right after that you broke Vukovich's collarbone."

"I knew there was something I didn't like about you, you little misanthrope. That's what it was—you were crawling around in my mind, poking your nose into my thoughts. That's what all this fancy equipment is for, isn't it."

"Other people know, too. I've told other people."

"Who's going to believe you?"

"You were arrested once."

"So I was. But they let me go. There was no proof. There's still no proof."

"Yes there is. I'll go to court; I'll testify."

"Not when I get through with you, you won't. That sailor threatened to tell. I shut him up. I'll shut you up."

"Get away from there."

"You shouldn't have gone up the tower. This ladder's the only way down. That's not too smart, but then, you're only an ape. And you're going to be one dead ape when I catch you."

Adam screamed. The sounds echoed through the silent grounds of the institute.

"There's lots more room for another grave out there. I'll just bury you a little deeper."

"Let's go—come on." Schoonover ran for the door. He had a gun in his hand, and he was moving.

Mac, also armed, was right behind him; Felix, with shorter legs than the other two, had to be satisfied with last place.

Once at the door it didn't matter. They all bunched up. The door was locked.

"How?" Schoonover fished in his pocket, then suddenly remembered he didn't have his keys.

"Young must have done it when he saw Adam on the analyzer," said Mac.

Felix didn't waste time, either looking for keys or talking about it. He brought up his gun and blew the lock out with two ear-shattering blasts.

Inside they quickly surrounded the analyzer, on which Young now hung, like King Kong, facing his new enemies. Fortunately he was a long way from Adam, who now stood erect on top of the scanner module.

Facing three guns, and with no chance, Young gave up. He came down and was promptly placed under arrest.

Without his crib card, which all cops normally carry, Felix stumbled comically through the required admonitions, while Young listened sullenly.

"Call this in," he told Delmar. "I don't have any cuffs to put on him."

"It's been done, Felix." Delmar looked up at Adam and smiled. *Thanks for the relay, pal,* he thought, in his own voice. *Don't mention it,* he heard, in Adam's.

Three *Homo sapiens* and a *Homo novus* sat at the table in the kitchen of Chateau Schoonover. The *Homo sap-*

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iens drank coffee; the *Homo novus* drank orange juice.

Ruth was still pouting. "It's not so much that you left me out of this; it's the risk Adam took. That man's a killer, and a big, strong killer at that."

Delmar was quick to reply. "The danger was minimal, Ruth. We were there. We were armed and he wasn't. No damage has been done. At least, none to compare with what would have resulted from Adam's testimony at a trial."

"I wish I could have heard the tape before Felix ran off with it, Delmar. Then maybe I'd know for sure whether or not you got a good confession. After all, you're an amateur, and the trouble with amateurs is that their work doesn't always measure up."

"Well, it didn't look to me like you professionals were doing so well, sitting there arguing and trying to talk me into going along with a trial. You didn't even seem to want to consider any other way.

"That's why I left. I woke Adam up, and he tuned into your argument. He didn't like June's idea either, especially that part about having Mac explain his theory in court.

"That was when we decided to do it our way. Ours was a more logical alternative."

"And here, all along, I thought you were angry at me."

"Well, yeah, sure; I guess I was—at first, that is. Anyhow, we grabbed Mac after you went to bed, got him in on it. Then we all went out to the lab and wired some open mikes into the P.A. system. The switch for them and the recorder was up at the top of the cradle so Adam could turn it on when he was ready. In the meantime, Adam kept track of Young for us.

"Mac had him scheduled to start early and stay late, to keep him out of town and out of trouble, so we were laying for him when he got there. The rest, you know. Pretty slick, huh?"

"You left the door unlocked, Dad. It's a good thing I was already inside, because Young locked it after him when he came in."

"Oh. Well, nobody's perfect."

Ruth took a big sip of her coffee and put the cup down solidly on the table. "You know what's going to be on the tape, of course."

"Sure," said Delmar. "Young's voice, confessing to one murder and describing his attempt at another."

"Uh-huh. You'd better hope that's what Young thinks, too. And you'd better hope he makes an additional statement before he finds out he's the only one talking on the tape."

"What difference does that make?"

"It makes a lot of difference. If Bud wants to put it in evidence, that tape will have to be authenticated. He won't even attempt it under the circumstances."

"Why not?"

"Because, while *he* knows why it's blank, he can't say anything about it unless he wants to sound as silly as Young does. Bud knows that, aside from the six of us, nobody knows Adam is a telepath. He also knows that under the circumstances none of us will admit to it. That leaves him, and Young, to tell the story. And Young might put the information to a use you three never thought of; he might use it to prop up an insanity defense for himself—you

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know, like he was hallucinating at the time he said all this."

"He wouldn't."

"Sure he would. If I were his lawyer I'd certainly tell him to. After all, here he is talking to himself on the D.A.'s tape recording, and certainly saying some irrational things. What can Bud say in response? Is he going to say he erased selected portions of the tape, is he going to side with Young and say he's heard that same voice himself when he knows the four of us will play dumb? No sir. That's not the sort of stunt that helps a D.A. get re-elected. I don't know about you amateurs."

"Now wait a minute, Ruth," McKeever interjected. "I thought that was a pretty shrewd move. Young never suspected we wired the lab."

"Sure, Mac. You're thinking like a croaker: 'It's a good idea because I like it and it uses a lot of neat gadgets.' That proves not just any clod could do it, right?"

Except for Adam's and Ruth's, every mouth was hanging open.

Adam, who had been content just to tune in, now chimed in. "Ruth wants to know what you guys have against ears, and why you just didn't hook up a simple P.A. system. She wonders why you had to gild the lily by trying to make a record, too."

"That wouldn't have worked, Adam. We were trying to get airtight proof."

"Yes it would, Dad. I just dipped into our resident expert again. Ruth's thinking about evidence now, and it's elementary: a witness who hears a party make an admission of guilt, by whatever means, and if his testimony is otherwise admissible, is entitled to repeat the defendant's statement from the stand. Besides me, there was you, and Mac, and Deputy Juarez; we all could have testified to what Mr. Young said. The tape wasn't necessary. It's just a m-millstone, whatever that means, around Mr. June's neck." "

"Adam, there's something I think you ought to try to understand, now that you're growing up."

"What's that, Dad?"

"That while this is what is commonly known as a man's world, the only reason it stays that way is that we stick together. Whose side are you on, anyway?"

"The winning side, Dad. I guess when it comes to lady lawyers, I'd have to say I'm pro-counsel. You will pardon the pun, won't you?" ■

● "The master masons, holding measuring rod and glove in hand, say to others: "Cut here," and they do not work; nevertheless they receive the greater fees. Some work with words only . . . rarely or never putting his hand to the task, but . . . receiving higher wages than the others."

—Nicholas de Biard
13th century Dominican Preacher

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THE QUALITY THROOP

Rowland Shew

Kelvin Throop (Sr.) has struck
again, this time under
his own name as Quality Manager
at an electronics company.
Regrettably, the name
of the company has been withheld
by Mr. Shew, who forwarded
these scraps of evidence to us,
so we still don't know
where Throop is. . . .

TO: Jason Cutworth, Fabrication Department

Let me congratulate you on finishing the waldos for Radioactive Products Corporation only two months behind schedule. That must be some sort of record for the fab shop.

By the way, this memo should reach you at about the same time as the waldos. It seems RPC's source inspector has rejected them. Next time you get a bright idea to save money by changing parts of the specs, do us all a favor and forget it. Any more savings of this magnitude and we could go out of business. We have to redo the entire job at our expense because what you made won't mate with the rest of their equipment.

Kelvin Throop, Quality Control

TO: Phil Dicheall, Plant Manager

I was intrigued by your statement at last week's staff meeting that Zero Defects is an unrealistic idea. For heaven's sake, don't let the Japanese know: they've been doing ZD for a long time. Maybe it will drive them out of business.

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Since you do not want Zero Defects, could you let me know just how many defects you *do* want? I will do all in my power to support the effort. My people will write up any assembler who inadvertantly makes too few errors. In the meantime we can get started with incoming inspection, making sure an optimal number of defectives are passed through to manufacturing.

Kelvin Throop, QC

TO: Ken Schoepfer, Creative Services

I agree that the new package designs for our consumer products division are indeed works of art. I want framed copies of all of them and will try to get your autograph on them while there's still time. Unfortunately, the presses in our packaging plant can only print five colors at a time and your designs call for six. Naturally, you could not have known this since the plant is not on the second floor of the administration building nor in the lunchroom. Would it be too much to ask that in the future you be a little less creative and a little more of a service.

Kelvin Throop, Design Review Committee

TO: Alice McQuota, Assembly Department

Thank you for taking the time to show me how tightly you control your process. The idea of adjusting the process every time the quality is the least bit off the average is so brilliant, I wonder that no one has ever thought of it before. It seems astounding that such tight control could still produce 10% scrap. The "newfangled" charts I showed you were invented at Bell Labs in the 1920's and taught to our Japanese competitors in the 1950's; but let's not rush into things. I think you will find that if your people would keep their cotton-picking fingers off the equipment except when the chart gives them a signal, you would get better quality at far less effort.

Kelvin Throop, QC

P.S. Did you know that half the schoolchildren in this country are below average in weight? This disgraceful situation should be remedied at once!

John Versteck, President
JV Electronics
Ref: Part #WX3–0079
Dear Sir:

A most amazing thing has come to my attention. I would like to write it up for the professional journals, and since it involves a component we buy from you, I thought you would like to know about it.

Four weeks ago I issued instructions to our receiving inspectors to turn your shipping cartons upside down before opening them and taking a sample. While no failures had ever been found before when sampling from the top, the components in the bottom tray ran as high as 50% defective. A more suspicious person than myself might think that the defectives had been "buried" in the hope that the

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inspectors would not find them. I am sure there is some perfectly innocent explanation and look forward to it every bit as much as I did to reading *The Hobbit*.

Sincerely,
Kelvin Throop

TO: Henry Grippesou, VP & General Manager
California Plant
SUBJECT: Downtime Audit

At your request we sent a quality engineer from Corporate HQ to investigate your problem with excessive downtime. As I recall, you wanted us to "find the SOB responsible" so you could "fire his ass and put the fear of God into him." Our man found that none of the machines or operators had significantly more downtime than the others. However, the operators did tell him that the problem had started with a switch to a new material vendor. A few chemical tests showed the new material to be of an inferior grade. When he asked your buyer about the change, he was shown the attached Plant Policy requiring that purchases be made from the lowest bidder. In the approval block, you will find the signature of the SOB responsible.

Yours in Christ, *Kelvin Throop*

TO: Marcia Drawlein, Drafting Supervisor

The problem is that the shaft diameter on the latest issue of Drawing 300–18–88765 is 2.347″ while on previous issues it has been 2.374″. I appreciate your suggestion that the draftsperson must be right while the engineer and everyone else is wrong. The proposal for Manufacturing Engineering to modify the rest of the process to accommodate the undersized shaft is nothing if not ingenious. The massive drawing revisions will certainly keep you busy and justify the new draftsperson you've been asking for. However, I've got a better idea. Why don't we scrap out the defective parts while you correct your drawing error?

K. Throop, Quality Control

TO: Peter Truvay, Director of R & D

It is my sad duty to inform you that, once again, Project 24J(8) has failed to pass the functional tests. Since I have urged you the last three times to consider redesign options, I must conclude that the real objective is to qualify the designed system rather than design a qualified system. Since the control units did not fail, your suggestion of "technician error" would mean that the same people doing the same test with the same equipment suddenly forgot how to do it right. This does not seem too likely to me.

I am sorry to hear that you had promised the President and the Board a customer-deliverable product by June and that the tests are causing delays in the schedule. Next time don't promise something you can't deliver.

Kelvin Throop, QC

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TO: Georgia Quashreiber, Technical Writing Department

By now you are no doubt aware that the reason the assemblers failed to connect the red wire was because the Process Specification failed to tell them so. Your explanation that the missing instruction "goes without saying" and was "implied in the body of the document" indicates you have a bright future as a political press secretary. Unfortunately, our company needs *technical* writing, not *creative* writing. Why not just write what the Process Engineer tells you and not try to improve on it? As far as I can tell, you've never *seen* the 10K(6) unit. Doesn't that hamper your writing about it?

Kelvin Throop, QC

P.S. Instruction 1.1 read: "Activate the mechanism by turning the red power switch to the ON position." I realize I am not a Professional Writer, but wouldn't "Turn the unit on" have been sufficient?

TO: Hank Wexler
SUBJECT: Reorganization

I read where the consultants we have been feeding for the last nine months have recommended still another reorganization as the Answer To All Our Problems. Isn't that a little like rearranging the deck chairs on the *Titanic*? Far be it from me to be cynical, but aren't these the same people who have led us to where we are now? Having them change hats for a while will sure help a lot.

K. Throop

TO: Tim Durak
SUBJECT: QC Circles

You have asked whether the eight fifteen-minute training modules for QC Circles might be too much training. Are you kidding? I realize the true intent is to impress Top Management by getting a massive Program underway as quickly as possible, rather than to train the workforce in problem-solving techniques; but don't you think two hours is just a teensy bit superficial?

As you say, "unleashing" the workforce can achieve wonders. The Japanese for example credit QC Circles with a full 10% of their quality progress. Don't forget that they spent ten years in intensive statistical training for their top and middle management before the first circle was started. Stop looking for Quick Fixes and Easy Answers.

Kelvin Throop, QC ■

● I believe probably all the great fisheries are inexhaustible, that is to say, that nothing we do seriously affects the numbers of fish.

Thomas Huxley, 1883

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The Alternate View

Deterrent or Defense?

Jerry Pournelle

Thus be it ever when free men shall stand
Between their loved homes and the war's desolation . . .
"Star-spangled Banner," Verse 4

Frederick the Great said that "neither the peasants in the fields, nor the burghers in the towns, should know or care when the state was at war." The U.S. ideal is given in the "military's verse" of the "Star-spangled Banner." Allowing for differences in attitude—in Frederick's day conquest, though less successful than that of the Soviets today, was less berated in rhetoric—both intend that armies *defend* their nations.

There had always been exceptions, of course. Coastal towns were vulnerable to raids or bombardment from the earliest days of naval war. Even so, defenses were possible: witness Fort McHenry, where the "Star-spangled Banner" was written. For the most part, civilian populations were relatively safe until their national army had been defeated.

There grew up conventions, rules and laws of war. Most, such as the convention that undefended cities could be declared "open" and thus spared bombardment, were designed to protect the helpless. War might be barbaric, but some elements of civility might be preserved.

The airplane changed that. The British threw away the open city convention for wide-area bombardment. Their high-altitude night attacks by Bomber Command had an average miss distance of six miles. RAF bombardiers were told to dump their bombs anywhere they liked; they'd at least kill some Germans. Eventually the Germans retaliated. World War II became a war against the helpless, culminating in the stupidity of Dresden and Cologne and the utter barbarity of the indiscriminate fire raids on Tokyo.

Even then there was defense. The RAF, Luftwaffe, and Imperial Navy set new standards for heroism as they literally placed themselves between their homes and war's desolation. Bombers got through; but not all, and not all went home. Imperfect defense was better than no defense.

Nuclear weapons and the ICBM dealt the final blow to defense. The atom bomb, and later the hydrogen bomb, were so destructive that no more than a handful could devastate a nation's economy. World War II showed that a few bombers always got through—and there was no defense at all against the ICBM.

For a few years after the Soviets obtained nuclear weapons, the United States continued with the notion of defense. There are still abandoned missile sites around Los Angeles and other cities. Eventually, however, it was de-

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cided that the cost was too high and the effect too low. Interceptor aircraft would suffice to defend against conventional bombs; nothing would help against a nuclear attack. For the first time in our history we admitted that we could not defend ourselves. We adopted a doctrine of pure deterrence.

There always was an element of deterrence in our national policy. To deter someone is to prevent them from acting, through fear or doubt. If you seek to deter an attacker, one of the best deterrents is good defenses; if the attack is likely to fail, it's not rational to try it.

Unfortunately the United States found itself forced to a strategic doctrine of pure deterrence at a time when civilian intellectuals dominated strategic thought. Dterrence is a very soft concept. Defenses involve hardware and capabilities. One may have doubts about the adequacy of a defensive system versus a particular attack, but at least there is an objective event under debate: Can Sea Cat prevent a Mirage aircraft from attacking a ship? Deterrence, however, is a mental event. Only an attacker knows whether or not he has been deterred. The deterrer can only make guesses based on certain assumptions.

One of the assumptions is that deterrence is possible, i.e., that the potential enemy is sufficiently rational. Second, deterrence must be public. A secret defensive weapon may be decisive in actual combat; a secret deterrent weapon is utterly useless. Third, deterrence may be based on pure bluff; alas, far too many cheeseparing officials seized on this aspect as a way to save money. Weapons need not work—indeed, one need not have any weapons at all—so long as the enemy believes you have workable weapons.

There followed any number of brilliant theoretical essays on deterrence. They had subject matters such as "The Rationality of Irrationality." I recall reading with quiet approval the statement that "After all, if the other chap is rational, and really believes you, then your threat that if he doesn't give you the last piece of toast you'll blow your brains out all over his new suit will work." All you had to do was convince the other guy you were crazy enough to do it.

We didn't notice at first, but the defense of Europe became almost exactly analogous to that. In fact, it's worse. We now tell the Soviet leaders that if they attack Europe, we'll commit suicide by killing their helpless civilians while sparing their weapons and their leaders.

We've gone further. Part of the justification for the Interstate Highway System—the largest and most expensive building program in human history—was that under each approach ramp we would build a fall-out shelter. Then we adopted MAD, Mutual Assured Destruction, as strategic doctrine. The logic of MAD—never accepted by the Soviets—is that civil defenses are an act of aggression. If we protect our citizens, we must believe the Soviets would attack them; if they're properly deterred, they won't attack except in response to our attack; therefore we must be planning to attack. Note also that we must as a matter of policy believe they are deterred; if we harbor any doubts, then rationally we must attack first.

On the other hand, pure deterrence

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promised considerable savings. Since both sides were "like small boys standing in a pool of gasoline," there would be no need to collect matches. If the Soviets kill us, we'll kill them back; all we need, then, is enough to kill them with.

Accordingly, the U.S. installed the Minuteman system and quit. Since the Soviets were assumed to be rational, and therefore to think like U.S. university professors turned military theorists, they would understand this unambiguous signal. No one wants to feel inferior in this modern world; therefore the Soviets might build a few more weapons systems than we have, but once they'd caught up, it would silly for them to go on collecting matches. . . .

The theory was brilliant, but apparently one or another of the assumptions was wrong. When the Soviets "caught up" they didn't halt. They didn't even slow down. They kept four separate assembly lines going three shifts a day, turning out ICBMs as quickly as possible, to the detriment of their civilian economy.

They do it still.

Deterrence certainly hasn't deterred them from building weapons.

Perhaps, though, this is all to the good? These weapons they build—surely they're a mere waste of precious resources. There's nothing they can do with them. . . .

Now understand, there's no doubt that if the Soviet Union were ruled by Harvard professors, they'd be utterly deterred, not only from attacking the U.S., but also from adventures in Europe (and probably Afghanistan). Alas, here's some evidence that they're not.

* * *

There's a second problem with deterrence.

It's immoral.

Free men standing between their loved homes and the war's desolation is compatible with Judeo-Christian tradition and the Thomistic doctrine of Just War. Setting fire to the enemy's women and children isn't. Yet if we don't threaten to burn Russian schoolgirls, how can we honor our pledge to Europe? Without credible threats, we are thrown upon the good will of a gang of aged homicidal maniacs who have conclusively proved that they care very little for their own civilians, and nothing at all for anyone else's. Lest you doubt that, closely examine Andropov's role in the 1956 Hungarian uprising.

The dilemma is intolerable, and utterly divides the West.

In 1969 Stefan T. Possony and I published *The Strategy of Technology*. We argued strongly for a policy of "Assured Survival" in opposition to the McNamara policy of MAD. We also tried to convince the incoming administration; alas, we failed.

However, there always was considerable opposition to MAD. After the election of 1980 there was another concerted attempt to persuade the White House that Assured Survival is preferable. A number of conservative organizations; Edward Teller; Max Hunter and his "Gang of Four"; General Daniel O. Graham and Project High Frontier: all argued that MAD was bankrupt.

Eventually someone got through. On March 23 the president made an historic speech.

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He said: "I have become more and more deeply convinced that the human spirit must be capable of rising above dealing with other nations and human beings by threatening their existence."

He proposed that "we embark on a program to counter the awesome Soviet missile threat with measures that are defensive . . . What if free people could live secure in the knowledge that their security did not rest upon the threat of instant U.S. retaliation to deter a Soviet attack, that we could intercept and destroy strategic ballistic missiles before they reached our own soil or that of our allies?

"I know that this is a formidable technical task, one that may not be accomplished before the end of this century. Yet current technology has attained a level of sophistication where it's reasonable for us to begin this effort. . . .There will be failures and setbacks, just as there will be successes and breakthroughs . . . but isn't it worth every investment necessary to free the world from the threat of nuclear war? We know it is. . . .

"My fellow Americans, tonight we're launching an effort which holds the promise of changing the course of human history."

The response was rapid: a number of Congresscreatures giggled "Star Wars" and dubbed the President "Darth Vader."

However, when the *New York Times* took a poll—and even though its questions were as "neutral" as *Times* polls usually are—the American people responded to "Star Wars" by saying, 8 to 3, "Damn right, and about time, too."

* * *

On the weekend of July 29, 1983, we held in California the third meeting of the Citizen's Advisory Council on National Space Policy.

The Council is composed of some fifty top scientific, managerial, and political leaders of the pro-space movement and aerospace community. One purpose of our meeting was to examine the new policy of Assured Survival, and to suggest candidate systems which might be used in this historic endeavor.

We looked at problems as well. They're formidable. For all that, we concluded something startling: we could have, by 1990, a defensive system sufficient to render it impossible for the Soviet Union to eliminate the U.S. strategic deterrent forces.

True: on that time scale we still rely on deterrence, but from that moment on we rely less and less heavily on deterrence and more and more on defense.

The problems with defense are formidable. As an example, space-based components are vulnerable, both in peacetime and to wave attacks when the war begins.

Vulnerabilities can be overcome. One method is simple: harden the satellites. The simplest method for hardening is to surround them with mass. An excellent source of mass is green cheese—i.e., lunar materials. The first shovelful of green cheese is terribly expensive, almost as expensive as 50 MX missiles; after that green cheese gets cheaper, and it's being used for *defense*.

The Report of the Citizen's Advisory Council can be obtained from the L-5 Society, 1060 E. Elm, Tucson AZ 85719. Note that the Society sponsors

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the council; it does not necessarily endorse its conclusions.

The following open letter to the president was unanimously endorsed by those present. It represents a remarkable consensus among the most talented and best-informed group I have ever worked with.

30 July 1983

Dear Mr. President:

It has become a common, but erroneous, American dictum that an offense always overwhelms a defense. Yet Stalingrad and the Battle of Britain, to name two examples within memory, proved that a good defense can defeat a vigorous offense. We believe that a stable peace is best assured by a balance of offense and defense; and that *even a modestly effective defense* can powerfully deter a first strike by any aggressor.

We believe that several systems, both kinetic and directed energy systems, should be developed concurrently for a spectrum of strategic defenses. After years of neglect of strategic defense, we find it imperative that several avenues be pursued concurrently. We must not have a triad of offense and a monad of defense.

While we agree that point defenses by kinetic energy weapons serve an immediate need and should be developed, we believe the nation should vigorously investigate the uses of space for strategic defense.

We believe it is imperative that we first address four candidate systems which provide a significant military capability, i.e., to deny assurance of first-strike success by any aggressor by 1990.

•Multiple satellite using kinetic energy kill.

•Ground-based lasers and mirrors in space.

•Space-based lasers.

•Nuclear explosive-driven beam technologies collectively known as third generation systems.

We also urge greatly accelerated research on the many other candidate systems, including particle-beam weapons, which offer promise on the longer term.

Implicit in the adoption of our recommendations are the requirements to state openly and unequivocally our intent to adopt a balanced offensive-defensive national strategy and to assess the spectrum of threats and technical risks associated with actual deployment.

Systems Assessment Group
Citizen's Advisory Council
on National Space Policy

The systems we propose are not cheap, but defense is not cheap. The advantage is that we do not threaten the life of a single Russian schoolgirl.

Let the president and Congress know your views; for if we cannot build support for this, offensive systems will eat the budget and we will have another generation living under the balance of terror.

The choice is ours. ■

● Most of the change we think we see in life is due to truths being in and out of favor.

Robert Frost

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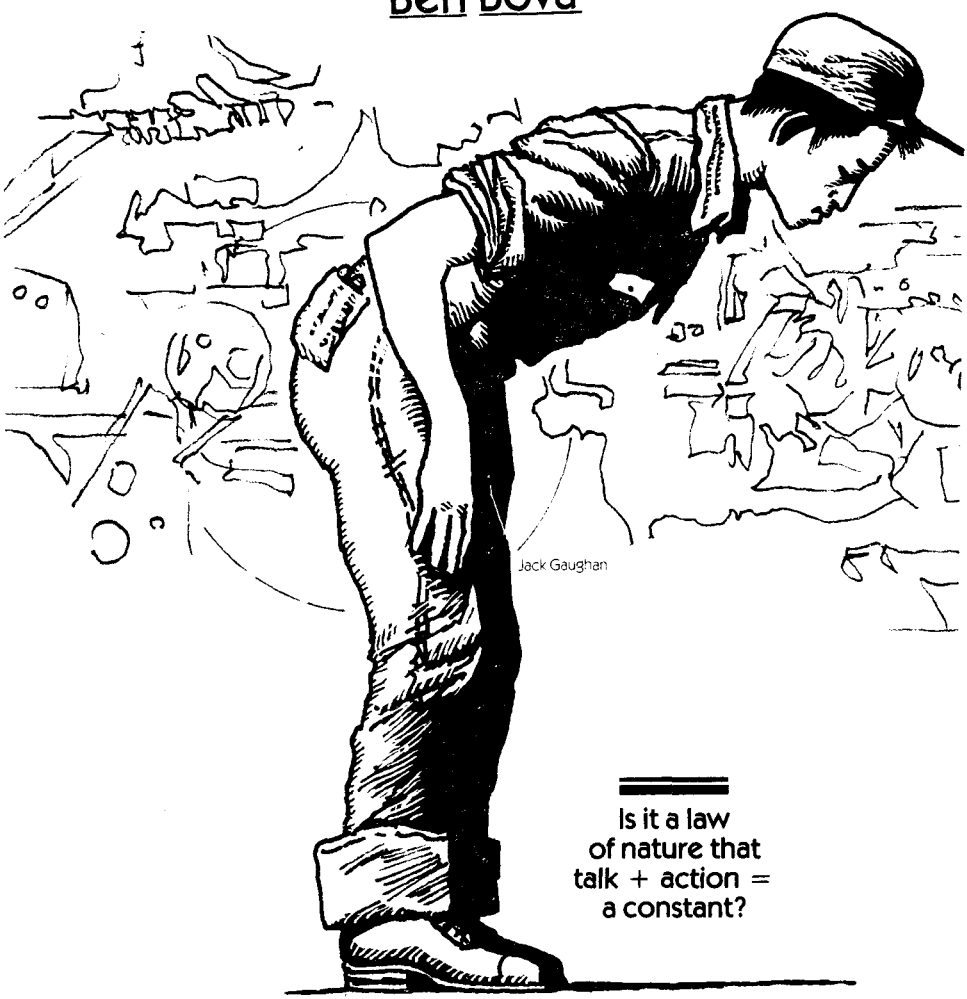
FREE ENTERPRISE

Ben Bova



Is it a law of nature that talk + action = a constant?

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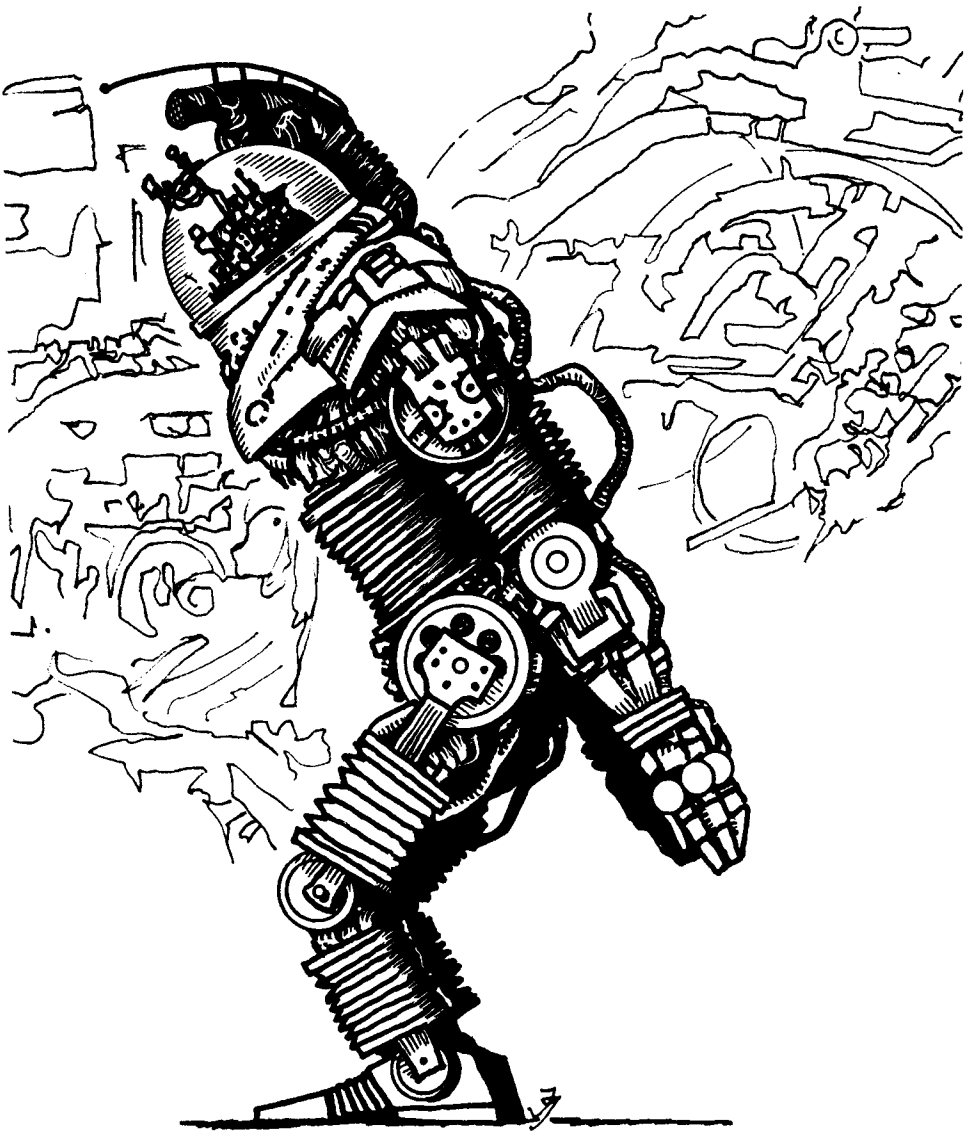

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The Idea

It happened at approximately midnight, late in April, when they both should have been studying for their final exams.

Mark Moskowitz (a.k.a. "Mark the Monk") and Mitsui Minimata shared a rented room over one of Berkeley's shabbier head shops, less than a half-mile from the campus. Mark was going for his doctorate in logic; Mitsui was working doggedly toward his in electrical engineering. The few friends they had claimed later that the idea was probably inspired by the various strange aromas wafting up from the shop below their room.

Mark's sobriquet was two-edged: not only did he have the heavy-browed, hairy, shambling appearance of an early hominid; he was, despite his ape-ish looks, exceedingly shy, bookish, and unsocial to the point of reclusiveness. Mitsui was just the opposite: tiny, constantly smiling, excrutiatingly polite, and an accomplished conversationalist. Where Mark sat and pondered, Mitsui flashed around the room like an excited electron.

He was struggling with a heavy tome on electrical engineering, just barely managing to stagger across the room with it, heading for his reading chair, when he tripped on the threadbare rug and went sprawling face-first. Mark, snapped out of his glassy-eyed introspection by the thud of his roommate's impact on the floor, spent a moment focusing his far-sighted eyes on the situation. As Mitsui slowly sat up and shook his head groggily, Mark heaved himself up from the sagging sofa which served as his throne, shambled over to his friend, picked the little Japanese up with one hand, the ponderous textbook in the other, and settled them both safely on Mitsui's reading chair.

"Thank you ten thousand times," said Mitsui, after a sharp intake of breath to show that he was unworthy of his friend's kindness.

"You ought to pick on books your own size," Mark replied. For him, that amounted to a sizzling witticism.

Mitsui shrugged. "There *are* no books my size. Not in electrical engineering. They all weigh a metric ton."

Mark glanced down at the weighty tome. "I wonder why they still print books on paper. Wouldn't electrons be a lot lighter?"

"Yes, of course. And cheaper, as well."

"H'mm," said Mark.

"H'mm," said Mitsui.

And they never spoke of the idea again. Not to each other, at least. A month later they received their degrees and went their separate ways.

The Presentation

Gene Rockmore blinked several times at the beetle-browed young man sitting in his office. "Mark M. Moskowitz, PhD," the visitor's card said. Nothing else. No phone number or address. Rockmore tried to engage the young man in trivial conversation while studying him. He looked like a refugee from a wrestling school, despite his three-piece suit and conservative tie. Or maybe because of them; the clothes did not seem to be his; they barely fit him, and he looked very uncomfortable in them.

For several minutes Rockmore chat-

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ted about the weather, the awful cross-town traffic, and the dangers of being mugged on Manhattan's streets. He received nothing back from his visitor except a few grunts and uneasy wriggles.

Why me? Rockmore asked himself silently. Why do I have to get all the crazies who come in off the street? After all, I'm a vice president now. I ought to be involved in making deals with agents, and taking famous writers out to lunch. At least Charlene's father ought to let me get into the advertising and promotion end of the business. I could be a smash on the Johnny Carson show, plugging our company's books. Instead, I have to sit here and deal with inarticulate ape-men.

Rockmore, who looked like (and was) a former chorus boy in a Broadway musical, slicked back his thinning blond hair with one hand and finally asked, "Well, eh, just what is it you wanted to talk to me about, Mr. Mos— I mean, *Dr.* Moskowitz?"

"Electronic books," said Mark.

"Electronic books?" Rockmore asked.

"Uh-huh." And for the next three hours, Mark did all the talking.

* * *

Mitsui hardly spoke at all, and when he did, it was in Japanese, a language both simple and supple. Most of the time, as he sat side by side with the vice president for innovation at Kanagawa Electronics and Shipbuilding, Inc., Mitsui tapped out numbers on his pocket computer. The v.p. grinned and nodded and hissed happily at the glowing digits on the tiny readout screen.

* * *

The Reception

Robert Emmett Lipton, president of Hubris Books, a division of WPA Entertainment, which is a wholly-owned subsidiary of Moribundic Industries, Inc., which in turn is owned by Empire State Bank (and, it is rumored, the Mafia), could scarcely believe his ears.

"Electronic books? What on earth are electronic books?"

Lipton smiled gently at his son-in-law. It didn't do to get tough with Rockmore. He simply broke down and cried and went home to Charlene, who would then phone to tell her mother what a heel her father was to pick on such a sensitive boy as Gene.

So the president of Hubris Books rocked slowly in his big leather chair and tried to look interested as his son-in-law explained his latest hare-brained scheme. Lipton sighed inwardly, thinking about the time Rockmore suggested to the editorial board that they stop printing books that failed to sell well, and stuck only to Best Sellers. That was when Rockmore had just graduated from the summer course in management at Harvard. Ten years later, and he still didn't know a thing about the publishing business. But he kept Charlene happy, and that kept Charlene's mother happy, and *that* was the only reason Lipton allowed Rockmore to play at being an executive.

"So it's possible," Rockmore was saying, "to make the thing about the size of a paperback book. Its screen would be the size of a book page, and it could display a page of printed text or full-color illustrations . . ."

"Do you realize how much color sep-

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arations cost?'' Lipton snapped. Instantly he regretted his harshness. He started to reach for the Kleenex box on the shelf behind his chair.

But Rockmore did not burst into tears, as he usually did. Instead he smirked. ''No color separations, Papa. It's all done electronically.''

''No color separations?'' Lipton found that hard to believe.

''No color separations. No printing at all. No paper. It's like having a hand-sized TV set in your . . . er, hand. But the screen can be any page of any book we publish.''

''No printing?'' Lipton heard his voice echoing, weakly. ''No paper?''

''It's all done by electronics. Computers.''

Lipton's mind was in a whirl. He conjured up last month's cost figures. The exact numbers were a blur in his memory, but they were huge—and most of them came from the need to transport vast tonnages of paper from the pulp mills to the printing plants, and then from the printing plants to the warehouses, and then from the warehouses to the wholesalers, and then . . .

He sat up straighter in his chair. ''No paper? Are you certain?''

* * *

Mitsui bowed low to the president of Kanagawa. The doughty old man, his silver hair still thick, his dark eyes still alert, sat on the matted floor, dressed in a magnificent midnight-blue kimono. He barely nodded his head at the young engineer and the vice president for innovation, both of whom wore western business suits.

With a curt gesture, he commanded them to sit. For long moments, nothing was said, as the servants brought the tea. The old man let his favorite, a young woman of heartbreakingly fragile beauty, set out the graceful little cups and pour the steaming tea.

Mitsui held his breath until the v.p. nodded to him. Then, from the inside pocket of his jacket, Mitsui pulled out a slim package, exquisitely wrapped in expensive golden gift paper and tied with a silk bow the same color as the president's kimono. He held the gift in outstretched arms, presenting it to the old man.

The president allowed a crooked grin to cross his stern visage. As the v.p. knew, he took a childish pleasure in receiving gifts. Very carefully, the old man untied the bow and peeled away the heavy paper. He opened the box and took out an object the size of a paperback book. Most of its front surface was taken up by a video screen. There were three pressure pads at the screen's bottom, nothing more.

The old man raised his shaggy brows questioningly. The v.p. indicated that he should press the first button, which was a bright green.

The president did, and the little screen instantly showed a listing of titles. Among them were the best-selling novels of the month. By pressing the buttons as indicated, the old man got the screen to display the opening pages of half a dozen books within less than a minute.

He smiled broadly, turned to Mitsui and extended his right hand. He clasped the young engineer's shoulder the way

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a proud father would grasp his bright young son.

The Evaluation

Lipton sat at the head of the conference table and studied the vice presidents arrayed about him: Editorial, Marketing, Production, Advertising, Promotion, Subsidiary Rights, Legal, Accounting, Personnel, and son-in-law. For the first time in the ten years since Rockmore had married his daughter, Lipton gazed fondly at his son-in-law.

"Gentlemen," said the president of Hubris Books, adding his usual smarmy nod to the Editor-in-Chief and the head of Subsidiary Rights, "and ladies . . ."

They were shocked when he invited Rockmore to take the floor, and even more startled when the former chorus boy made a fifteen-minute presentation of the electronic book idea without falling over himself. It was the first time Lipton had *asked* his son-in-law to speak at the monthly executive board conference, and certainly the first time Rockmore had anything to say that was worth listening to.

Or was it? The assembled vice presidents eyed each other nervously as Rockmore sat down. No one wanted to be the first to speak. No one knew which way the wind was blowing. Rockmore sounded as if he knew what he was talking about, but maybe this was a trap. Maybe Lipton was finally trying to get his son-in-law bounced out of the company, or at least off the executive board.

They all fidgeted in their chairs, waiting for Lipton to give them some clue as to what they were supposed to think. The president merely sat up at the head of the table, fingers steepled, smiling like a chubby, inscrutable Buddha.

The silence stretched out to an embarrassing length. Finally, Editorial could stand it no longer.

"*Another* invasion by technology," she said, her fingers fussing absently with the bow of her blouse. "It was bad enough when we computerized the office. It took my people *weeks* to make the adjustment. Some of them are still at sea."

"Then get rid of them," Lipton snapped. "We can't stand in the way of progress. Technology is the future. I'm sure of it."

An almost audible sigh of relief went around the table. Now they knew where the boss stood; they knew what they were supposed to say.

"Well, of course technology is important," Editorial backtracked, "but I just don't see how an electronic thingamajig can replace a *book*. I mean, it's cold . . . metallic. It's a *machine*. A book is . . . well, it's comforting, it's warm and friendly, it's the feel of paper . . ."

"Which costs too damned much," Lipton said.

Accounting took up the theme with the speed of an electronic calculator. "Do you have any idea of what paper costs this company each month?"

"Well, I . . ." Editorial saw that she was going to be the sacrificial lamb. She blushed and lapsed into silence.

"How much would an electronic book sell for?" Marketing asked.

Lipton shrugged. "One dollar? Two?"

Rockmore, from the far end of the table, spoke up. "According to the tech-

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nical people I've spoken to, the price of a book could be less than one dollar."

"Instead of fifteen to twenty," Lipton said, "which is what our hardcovers are priced at now."

"One dollar?" Marketing looked stunned. "We could sell *zillions* of books at a dollar apiece!"

"We could wipe out the paperback market," Lipton agreed, happily.

"But that would cut off a major source of income for us," cried Sub Rights.

"There would still be foreign sales," said Lipton. "And film and TV rights."

"I don't know about TV," Legal chimed in. "After all, by displaying a book on what is essentially a television screen, we may be construed as utilizing the broadcast TV rights . . ."

The discussion continued right through the morning. Lipton had sandwiches and coffee brought in, and the executive board stayed in conference well past quitting time.

* * *

In the port city of Numazu, not far from the blissful snow-covered cone of divine Fujiyama, Kanagawa Industries began the urgent task of converting one of its electronics plants to building the first production run of Mitsui Minimata's electronic book. Mitsui was given the position of advisor to the chief production engineer, who ran the plant with rigid military discipline. His staff of 600 (588 of them robots) worked happily and efficiently, converting the plant from building navigation computers to the new product.

* * *

The Resistance

Editorial sipped her Bloody Mary while Sub Rights stared out the restaurant window at the snarling Manhattan midtown traffic. The restaurant was only half-filled, even though this was the height of the lunch-hour rush; the publishing business had been in the doldrums for some time. Suave waiters with slicked-back hair and European accents hovered over each table, anxious to generate tips through quality of service, when it was obvious that quantity of customers was lacking.

Sub Rights was a pale, ash-blonde woman in her late thirties. She had worked for Hubris Books since graduating from Barnard with stars in her eyes and dreams of a romantic career in the world of literature. Her most romantic moment had come when a French publisher's representative had seduced her, at the height of the Frankfurt Book Fair, and thus obtained a very favorable deal on Hubris's entire line of "How To" books for that year.

"I think you've hit it on the head," Sub Rights said, idly stirring her Campari-and-soda with its plastic straw. "Books should be made of *paper*, not this electric machine thing."

Editorial had worked for six publishers in the twelve years since she had arrived in New York from Kansas. Somehow, whenever the final sales figures for the books she had bought became known to management, she was invited to look for work elsewhere. Still, there were plenty of publishing houses in mid-town Manhattan which operated on the same principle: fire the editor when sales don't pan out, and then hire

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an editor fired by one of your competitors for the same reason.

"That's what I think, too," she said. Her speech was just a little blurred, her tinted auburn hair just a bit frazzled. This was her third Bloody Mary and they had not ordered lunch yet.

"I love to curl up with a book. It's cozy," said Sub Rights.

"Books are supposed to be made of paper," Editorial agreed. "With pages that you can turn."

Sub Rights nodded unhappily. "I said that to Production, and do you know what *he* said?"

"No. What?"

"He said I was wrong, and that books were supposed to be made of clay tablets with cuneiform marks pressed into them."

Editorial's eyes filled with tears. "It's the end of an era. The next thing you know, they'll replace us with robots."

* * *

The chief engineer paced back and forth, hands clasped behind his back, as the two technicians worked feverishly on the robot. The entire assembly area of the factory was absolutely still; not a machine moved, all across the wide floor. Both technicians' white coveralls were stained with sweat and oil, a considerable loss of face for men who prided themselves on keeping their machines in perfect working order.

The chief engineer, in his golden-tan coveralls and plastic hard hat, alternately glared at the technicians and gazed up at the huge digital clock dominating the far wall of the assembly area. Up in the glass-panelled gallery above the clock, he could see Mitsui Minimata's young, eager face peering intently at them.

A shout of triumph from one of the technicians made the chief engineer spin around. The technician held a tiny silicon chip delicately between his thumb and forefinger, took two steps forward and offered the offending electronic unit to the chief engineer. The chief took it, looked down at the thumbnail-sized chip, so small and insignificant-seeming in the palm of his hand. Hard to believe that this tiny grain of sand caused the robot to malfunction and ruined an entire day's work. He sighed to himself, and thought that this evening, as he relaxed in a hot bath, he would try to compose a haiku on the subject of how small things can cause great troubles.

The junior of the two technicians, in the meantime, had dashed to the automated supply dispenser across the big assembly room, dialed up a replacement chip, and come running back with the new unit pressed between his palms. The senior technicians installed it quickly, buttoned up the robot's access panel, turned and bowed to the chief engineer

The chief grunted a grudging approval. The junior technician bowed to the chief and asked permission to activate the robot. The chief nodded. The robot stirred to life, and it too bowed to the chief engineer. Only then did production resume.

* * *

The Sales Manager for Hubris Books stroked his chin thoughtfully as he sat

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behind his desk conversing with his western district sales director.

"But if they ever start selling these electronic doo-hickeys," the western district man was saying, "they'll bypass the wholesalers, the distributors, even the retail stores, for cryin' out loud! They'll sell those little computer discs direct to the customer! They'll sell 'em through the mail!"

"And over the phone," the Sales Manager added wearily. "They're talking about doing the whole thing electronically."

"Where's that leave us?"

"Out in the cold, buddy. Right out in the cold."

The Decision

Robert Emmett Lipton was not often nervous. His position in life was to make other people nervous, not to get the jitters himself. But he was not often summoned to the office of the CEO of Moribundic Industries. Lipton found himself perspiring as the secretary escorted him through the cool, quiet, elegantly carpeted corridors toward the CEO's private suite.

It wasn't as if he had been asked to report to the bejewelled jackass who headed WPA Entertainment, out in Los Angeles. Lipton could deal with him. But the CEO was different; he had the real power to make or break a man.

The secretary was a tall, lissome, devastatingly beautiful woman: the kind who could marry a millionaire and then ruin him. In the deeper recesses of his mind, Lipton thought it would be great fun to be ruined by such a creature.

She opened the door marked *Alexander Hamilton Stark, Chief Executive Officer* and smiled at Lipton. He thought there was a trace of sadness in her smile, as if she never expected to see him again—alive.

"Thank you," Lipton managed, as he stepped into the CEO's private office.

He had seen smaller airport terminals. The room was vast, richly carpeted, furnished with treasures from the orient in teak and ebony, copper, silver, and gold. Far, far across the room, the CEO sat behind his broad, massive desk of rosewood and chrome. Its gleaming surface was uncluttered.

Feeling small and helpless, like a pudgy little gnome suddenly summoned to the throne of power, Lipton made his way across the vast office, plowing through the thick carpeting with leaden steps.

The CEO was an ancient, hairless, wrinkled, death's-head of a figure, sitting hunched and aged in a high-backed leather chair that dwarfed him. For a ridiculous instant, Lipton was reminded of a turtle sitting there, staring at him out of dull reptilian eyes. With something of a shock, he suddenly realized that there was a third man in the room: a younger man, swarthy, dark of hair and jaw, dressed in a European-cut silk suit, sitting to one side of the massive desk.

Lipton came to a halt before the desk. There was no chair there, so he remained standing.

"Mr. Stark," he said. "I'm so happy that you've given me this opportunity to report directly to you about the electronic book project."

"You'll have to speak louder," the

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younger man said. "His batteries are running down."

Lipton turned slightly toward him. "And you are?"

"I'm Mr. Stark's personal secretary and bodyguard," the young man said.

"Oh."

"We hear that Hubris Books is in hock up to its elbows on this electronic book thing," the bodyguard said.

"I wouldn't . . ." Lipton stopped himself, turned toward the CEO and said, louder, "I wouldn't put it that way. We're pushing ahead on a very difficult project."

"Don't give up the ship," the CEO muttered.

"We don't intend to, sir," said Lipton. "It's quite true that we've encountered some difficulties in the electronic book project, but we are moving right ahead."

"I have not yet begun to fight!" said the CEO.

Lipton felt himself frown slightly, puzzled.

The bodyguard said, "Our sources of information say that morale at Hubris is very low. And so are sales."

"We're going through a period of adjustment, that's true . . ."

"Millions for defense," the CEO's quavering voice piped, "but not one cent for tribute."

"Sir?" Lipton felt confused. What was the CEO driving at?

"Your costs are shooting through the roof," the bodyguard accused.

Lipton felt perspiration beading his upper lip. "We're involved in a very difficult project. We're working with one of the nation's top electronics firms to produce a revolutionary new concept, a product that will totally change the book business. It's true that we've had problems—technical as well as human problems. But . . ."

"We have met the enemy," croaked the CEO, "and they are ours."

"I don't want to be overly critical," said the bodyguard-cum-secretary, with a smirk on his face that belied his words, "but you seem to have gotten Hubris to a point where sales are down, costs are up, and profits will be a long time coming."

"But listen," Lipton replied, trying to keep his voice from sounding as if he were begging, "this concept of electronic books is going to sweep the publishing industry! We'll be able to publish books for a fraction of what they cost now, and sell them directly to the readers! Our sales volume is projected to triple, the first year we're on the market, and our profit margin . . ."

"Fifty-four forty or fight!" cackled the CEO.

"What?" Lipton blurted.

The bodyguard's smile seemed knowing, cynical. "We've seen your projections. But they're all based on the assumption that you'll have the electronic books on the market next year. We don't believe you can do that, not at the rate you're going now."

"As I said, we've had some problems here and there." Lipton was starting to feel desperate. "We contracted with Moribundic's electronics division, at first, to make the damned things, but they flubbed the job completely. They produced a monstrosity that weighed seventeen pounds and didn't work half the time."

The CEO shook his wizened head.

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"My only regret is that I have but one life to give for my country."

Suppressing an urge to run screaming out of the room, Lipton slogged forward. "The company we're working with now is based in Silicon Valley, in California. At least they've got the electronics right. But they've got problems with their supply of parts. Seems there's a trucker's strike in Texas, where the chips are being manufactured. This has caused a delay."

"And in the meantime, Hubris's sales are sinking out of sight."

"The whole book industry is in a bad way . . ."

The bodyguard raised his dark eyebrows half an inch, as if acknowledging the point. "But we're hearing complaints about poor morale in the office. Not just down in the pits, but among your own executive board."

Lipton growled, "Those dimwitted idiots can't see any farther than their own paychecks! They're afraid that the electronic book is going to take away their jobs."

"Your profit-and-loss projections are based, in part, on eliminating most of their jobs, aren't they?"

"Well, yes, of course. We won't need them anymore."

The CEO's frail voice became mournful. "It is for us, the living, rather to be dedicated here to the unfinished work . . ." His voice sank to an unintelligible mumble, then rose again to conclude, "that these dead shall not have died in vain."

As if the CEO were not in the room with them, or at least not in the same plane of reality, the bodyguard launched into a detailed analysis of Lipton's electronics books project. He referred to it specifically as Lipton's project. Hubris Books' president felt sweat trickling down his ribs. His hands shook and his feet hurt as he stood there defending every dollar he had spent on the idea.

Finally the bodyguard turned to the CEO, who had sat unmoving and silent for the past hour.

"Well, sir," he said, "that brings us up to date on the project. The potential for great profits is there, but at the rate we're going, the cost will drag the entire corporation's p-and-l statement down into the red ink."

The CEO said nothing; he merely sat hunched in his oversized chair, watery eyes blinking slowly.

"On the other hand," the bodyguard went on, "our tax situation should be vastly improved by all these losses. If we continue with the electronic book project, we won't have to worry about the IRS for the next three years, at least."

Lipton wanted to protest, to shout to them that the electronic book was more than a tax dodge. But his voice was frozen in his throat.

"What's your decision, sir?" the bodyguard asked.

The CEO lifted one frail hand from his desktop and slowly clenched it into a fist. "Damn the torpedoes! Full steam ahead!"

The Result

Mitsui Minimata held his breath. Never in his happiest dreams had he entertained the idea that he would someday meet the Emperor face to face, in the Imperial Palace. Yet here he was,

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kneeling on a silken carpet, close enough to the Divine Presence to touch him.

Arrayed around Mitsui, also kneeling with eyes respectfully lowered, were the head of Kanagawa Industries, the vice president for innovation, and the chief engineer of the Numazu plant. All were dressed in ceremonial kimonos more gorgeous than Mitsui would have thought it was possible for human hands to create.

The Emperor was flanked by serving robots, of course. It was fitting that a Divine personage not be touched by human hands. Besides, his decision to have robots serve him presented the Japanese people with an example of how these new devices should be accepted into every part of life.

With trembling hands Mitsui placed the first production unit of the electronic book in the metal fingers of the robot that stood between him and the Emperor. The robot pivoted, making hardly more noise than the heel of a boot would on a polished floor, and extended its arm to the Emperor.

The Emperor peered through his glasses at the little electronic package, then picked it up. He had been instructed, of course, on how to use the book. But for an instant Mitsui was frightened that somehow the instructions had not been sufficient, and the Emperor would be embarrassed by being unable to make the book work. Suicide would be the only way out, in that case.

After what seemed like several years of examining the book, the Emperor touched the green pressure pad at its base. Mitsui knew what would come up on the screen: a listing of all the books and papers that the Emperor himself had written in the field of marine biology.

The Divine face broke into a pleased smile. The smile broadened as the Emperor pecked away at the book's controls, bringing one after another of his own writings to the book's page-sized screen. He laughed with delight, and Mitsui realized that mortal life offered no higher reward than this.

* * *

Mark Moskowitz paced angrily back and forth across his one-room apartment as he argued with the image of his attorney on the phone screen.

"But they're screwing me out of my own invention!" he yelled.

The attorney, a sad-eyed man with an expression of utter world-weariness, replied, "Mark, when you accepted their money you sold them the rights to the invention."

"But they're lousing it up! Three years now and they still haven't produced a working model that weighs less than ten pounds!"

"There's nothing you can do about it," said the attorney. "It's their ball."

"But it's my idea! My invention!"

The attorney shrugged.

"You know what I think?" Mark growled, pacing back to the phone and bending toward the screen until his nose almost touched it. "I think Hubris Books doesn't *want* to make the project succeed! I think they're screwing around with it just to give the whole idea a bad name and make certain that no other publisher will touch it, by the time they're finished."

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"That's silly," said the attorney. "Why would they . . ."

"Silly?" Mark snapped. "How about last year, when they tried to make the picture screen feel like paper? How about that scheme they came up with to have a hundred separate screens that you could turn like the pages of a book? Silly? They're *crazy!*"

They argued fruitlessly for nearly half an hour, and finally Mark punched the phone's OFF button in a fury of frustration and despair. He sat in glowering, smoldering anger in the one-room apartment as the afternoon sun slowly faded into the shadows of dusk.

Only then did he remember why he had placed the call to his attorney. The package from Tokyo. From Mitsui. When it had arrived, Mark had gone straight to the phone to see what progress his suit against Hubris Books was making. The answer, of course, had been: zero.

With the dejected air of a defeated soldier, Mark trudged to the table by his hotplate where he had left the package. Terribly afraid that he knew what was inside the heavy wrappings, he nonetheless opened the package as delicately as if it contained newborn kittens.

It contained a newborn, all right. An electronic book, just as Mark had feared. No message, no card. Nothing but the book itself.

Mark held it in the palm of his left hand. It weighed a little more than a pound, he judged. Three pads were set below the screen, marked with Arabic numerals and Japanese characters. He touched the green one, which was marked "1."

A still picture of Mitsui appeared on the screen, grinning—no, *beaming*—at him. The amber pressure pad, marked "2," began to blink. Mark touched it.

A neatly typed letter appeared on the screen:

"*Dear Friend Mark:*

"*Please accept this small token of my deep friendship for you. In a few days your news media will be filled with stories about Kanagawa Industries' revolutionary new electronic book. I will tell every reporter I speak to that the idea is just as much yours as mine, which is nothing more than the truth.*

"*As you may know, trade agreements between your government and mine will make it impossible for Japan to sell electronic books in the U.S.A. However, it should be permissible for us to form an American subsidiary of Kanagawa in the United States. Would you consider accepting the position of chief scientist, with this new company? In that way, you can help to produce electronic books for the American market.*

"*Please phone me at your earliest convenience . . .*"

Mark read no further. He ran to the phone. He did not even bother to check what time it was in Tokyo. As it happened, he interrupted Mitsui's lunch, but the two ex-roommates had a happy, laughing talk together, and Mark agreed to become vice president for innovation of the planned Kanagawa-USA subsidiary.

Moral

Victor Hugo was right when he said that no army can withstand the strength of an idea whose time has come, but if you're narrow-minded enough, both the time and the idea can pass you by. ■

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the reference library

By Tom Easton

Broken Symmetries, Paul Preuss, Timescape, $15.95, 352 pp.
The Lazarus Effect, Frank Herbert and Bill Ransom, Putnam, $? (hb), 381 pp.
The Neverending Story, Michael Ende, Doubleday, $15.95, ? pp.
Bronwyn's Bane, Elizabeth Ann Scarborough, Bantam, $3.50, 304 pp.
The High Kings, Joy Chant, Bantam, $? (hb), 237 pp.
The Diamond Contessa, Kenneth Bulmer, DAW, $2.50, 174 pp.
The Galactiad, Gregory Kern, DAW, $1.95, 128 pp.
The Blackcollar, Timothy Zahn, DAW, $2.95, 272 pp.
Matilda's Stepchildren, A. Bertram Chandler, DAW, $2.50, 76 pp.
The Man Who Used the Universe, Alan Dean Foster, Warner, $2.95, 316 pp.
Starships, Isaac Asimov, Martin H. Greenberg, and Charles G. Waugh, Fawcett/ Ballantine, $3.50, 342 pp.
Caught in the Organ Draft, Asimov, Greenberg, and Waugh, Farrar, Straus & Giroux, $12.95, 276 pp.
Hallucination Orbit, Asimov, Waugh, and Greenberg, Farrar, Straus & Giroux, $12.95, 279 pp.

Ever since taking on this column, I have thought of myself as a reviewer, not a critic. I tell you a book exists; describe it just enough to let you decide whether it might appeal to you; and say whether I like it, and why. The "why" does get me into "critical" games now and then, but I remain a reviewer. That is what you, dear readers, want of me, and that is what I am equipped to be. My background is hardly literary.

However. Gale Research Co. will soon be publishing a two-volume compendium of *Contemporary Literary Criticism*, which will reprint a snippet from the March 1981 "Reference Library." It's not a whole column. It's not even a whole book review. It's just the few paragraphs in which I said Stephen King writes SF. And I mention it

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because it's a sign that Steve King and SF are officially certified as "literature." And *I*, by golly by gee, am a critic, whatever I call myself.

But don't fret. I won't let it go to my head. To prove it, let me tell you about Paul Preuss's latest, **Broken Symmetries.** The title comes from the realm of particle physics and accelerators, and it's appropriate. The scene is Hawaii, where the latest and biggest accelerator, TERAC, is being dedicated after a successful first year of operation. TERAC is a joint Japanese-American venture, with a Japanese director and an American experimental chief. The latter, Martin Edovich, has discovered a new particle, the massive, stable I-particle, revealing the "inside" quark. Peter Slater is a recent addition to TERAC's theoreticians who had earlier predicted the I-particle. He doubts its stability, but he allows himself to be convinced by the experimental record: TERAC has not yet blown up.

To the dedication come a host of dignitaries and press folk, including an axe-grinding reporter, Gardner Hey, and his lovely photographer, Anne-Marie. She is escaping temporarily from a dull marriage, her assignment arranged by Chauncey Tolliver, PR flack and Edovich's buddy. Not long after her arrival, while Hey seeks his grindstone, she meets the reclusive Slater and their own sparks fly. There is an explosion at TERAC. Sabotage seems to be in the air, but Slater's theories come alive again, and Big Science meets Big Brother.

By its end, *Symmetries* is a disaster novel. Along the way it is a suspense tale. At its start it is neither, for it seems then far more a novel of scene and character. It is only after he has built up his characters and the reader can empathize with them that Preuss allows his plot to take over the stage. To his credit, he does not plant omen after omen as promises of suspense and disaster. He leaves that to Timescape's blurb-writers, while he lets his story develop much as it really might in reality, something too few writers seem willing to do.

We don't need those omens, those constant hooks, to keep us reading. Any writer who can depict interesting people and events interestingly can hold our interest until the time for drama finally arrives. Preuss does it. Yet . . . yet . . . he does end with that disaster. I ask myself how necessary it is. It is *so* different from the way he began—but in that it does reflect the title, and so do other aspects of the tale. Perhaps we should say the symmetries must be deliberate—signs of Preuss's artistry, not failures—and can the quibbles. The book is very good, very enjoyable, with a strong climax and a satisfying resolution.

Buy it. You'll like it.

Frank Herbert's and Bill Ransom's **The Lazarus Effect** is less good. As we expect from Herbert, the story creates a novel society in detail: the world of Pandora once had both land and sea, but human colonists destroyed the sentient kelp that controlled the sea and kept the unstable crust of the planet still. Earthquake and tidal wave submerged land and colony, leaving a few survivors adrift, on bioengineeered rafts. Centuries later, those survivors have split into two cultures, one centered on living rafts, the other living in undersea domes. The first is life-oriented, the second machine-oriented. The first is conservative, with "Don't rock the boat" their watchword. The second is progressive; the Mermen are now mounting an expedition to orbit to retrieve the "hybernation" tanks left there by the colonizing

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ship; they are also recreating Pandora's kelp to restore land to the planet. The first is plagued by a high incidence of congenital abnormalities, some adaptive, some not, all the inheritance of a misguided genetic engineer of the past. The second is Earth-normal in form, thanks to both eugenics and recruitment of normals from the raft-dwellers.

Herbert and Ransom use this stage of marvelous potential to good effect. We see Pandora through the eyes of high and low, Merman and raft-dweller, male and female. We see mutants to whom form is incidental, to be taken advantage of or ignored in favor of the human light within. We see "normal" humans for whom form is one more excuse for racism. We see a Merman who plans to destroy the rafters and preserve the coming land for true humans alone, and here we encounter the story's plot.

Brett Norton is a rafter fisherman who, rescued by a Merman girl, falls into the thick of the plot. Through love and action he sees the story through, and he is there when the villain falls from his height and Pandora finds a future for mutant and normal alike. He —and others—attract our empathy and bring the story alive, and if it were up to them alone the story would be excellent indeed, moving and dramatic and vidid.

But Herbert and Ransom spoil it with the very gimmick that justifies their title. You see, the Mermen can recreate the kelp because that ancient genetic engineer somehow put kelp genes in humans, and the genes can be retrieved and reassembled. That much we can accept, but then the authors tell us that the kelp is not only sentient, but telepathic, and it can absorb the memories and personalities of the dead. The dead can live again for real, not just in the metaphor of nature.

Add to that that the kelp has the power to take over the end of the story, to become an active agent so powerful that we wonder how humans ever managed to destroy it, and it's just too much. We cannot swallow it. And the shame of it is that the super-kelp and its Lazarus effect are so unnecessary to the story.

Then again, you may have no problem with what I call excess. If so, enjoy.

According to the blurb on the bound galleys Doubleday sent me, **The Neverending Story** was a best-seller for three years in Germany, and then in Spain, Italy, and Japan; translation rights have sold in twenty-seven countries. The blurb promises the book fame in America too, and it may just be right.

The Neverending Story is by Michael Ende, translated most ably by Ralph Manheim, and illustrated (*not* in galleys, unfortunately) by Roswitha Quadflieg. It begins as a daydreaming outcast of a boy named Bastian Balthazar Bux finds a strange little bookshop whose gruff proprietor is reading a book bound in copper-colored silk and called *The Neverending Story*. The book is just what Bastian has always craved, as have all born bookworms—a story that never ends. And he swipes it.

Imagine his feelings when, after taking refuge in the deserted attic of his school, he opens the book and finds it describing his own entry into the bookshop, the proprietor and his reading matter, Bastian's theft of the book, his trip to the attic, and . . . But that is not until after he has read of a hero's search for the salvation of a kingdom being eaten up by patches of nothingness, learned that the kingdom is that magical realm of the imagination where dwell all the stories ever told (for as long as

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they retain believers in the real world), and learned that the kingdom can only be saved if a true human will willingly enter the kingdom and give its Childlike Empress a new name.

The Empress has called him, he has her name—Moon Child—but he is reluctant until he learns the Mobius nature of the book he holds. *Then* he cries, "Moon Child, I'm coming!" and dives into the story.

What befalls him there? All his wishes come true. He escapes utterly his drab and frustrating origins. In time he grows, he learns the proper use of fantasy, and he escapes again to his own world —where, it seems, he will become a famous writer or other variety of fantast.

The story offer levels of meaning —pure wish-fulfillment, paradox and intrigue, a philosophy of fantastic creation. It is thoughtful and astonishing and—perhaps above all—glowing with warmth and love. It deserves its status abroad, and it deserves as much again here. I only pray that Ende, who can surely retire young (how old *is* he?) on his royalties, can do as well again.

Have you ever read anything to compare with this book? Perhaps you have, for *The Neverending Story* is what Myers's *Silverlock* might have been. The two have the premise, a world where fantasies take life and into which a "real" human can step. But Ende's book is head and shoulders above the other.

Elizabeth Ann Scarborough's third novel of "lighthearted fantasy" is **Bronwyn's Bane.** I haven't read her first two books, but this one tells me they and future works are all worth a look. The lightheartedness is real, her story full of high good humor; and if Scarborough sometimes comes down with a severely cloying case of the cutes—well, some readers dote even on that.

Bronwyn is a princess cursed at birth with the inability ever to tell the truth. She can only lie, though as she grows she learns to use sarcastic inflections and gestures to make clear what she really means. As an overgrown teenager, she is packed off to visit a young cousin while her father is off to war, and then, with her cousin and an enchanted swan, she is off to find the answer to her curse. She meets sirens and sea serpents and hidebehinds, wicked kings and repulsive recluses, capitalist magicians and seven-league boots and magic pomegranates. She saves two kingdoms, gains a gypsy prince, and in the end is less than sure that it is best to lose her curse—she has found that *everyone* lies most, if not all, of the time, and none more than rulers.

I found it mildly irritating that I could not always be sure Bronwyn was lying, for she is often sensible and apt. Perhaps this simply means I am too used to lies, but I suspect Scarborough found it difficult to maintain a character who must always avoid the truth.

Joy Chant's **The High Kings** is a gem among all the Arthurian sagas that litter the marketplace. It is not a novel, but a collection of retold legends and myths, together with tidbits of history and anthropology, that illuminate the Arthurian background. Here we see the extravagant spirit of the Celts and the Roman influence that caused the Britons to trace their descent from Troy. We see a civilization on the borderline of savagery, as noble as Rome in its way, in defiant battle against Saxon incursions. We see the ambience that made Arthur and his people and perhaps we grasp Arthur himself better than any novel can let us.

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The book's structure is curious. Its frame is an episodic, incomplete life of Arthur. He journeys, schemes, and battles, and from time to time he asks his bards to tell stories. The stories they tell are the book's legends, each fitted to some Arthurian event. Among them lie brief discourses on the role of bards, the status of women, religion, superstitions, warriors, art, and more.

The book thus has the blended flavors of fantasy, history, and the fairy tales of childhood. The paintings and drawings by Briton George Sharp delightfully inform the whole, supporting, strengthening, and coloring with a hand as skillful as Chant's own.

If you have a taste, as I do, for myth and legend, for the spiritual antecedents of fantasy perhaps more than for fantasy itself, you will love *The High Kings*.

Ken Bulmer, long inactive on this side of the Big Ditch, returns with **The Diamond Contessa,** the tale of a boy who finds a doorway to a parallel Earth in his basement and grows up to pass through it. He has the trajector's power to open the casements between the worlds; and thanks to a childhood encounter in his basement hideaway, he has the skill and wisdom to keep his power hidden. Yet all his power fails to keep him safe when he hits the trails between the worlds. There are brigands there, who keep trajectors on leashes and kidnap slaves from worlds that know not the casements. There are heroes who fight the brigands, and there are frying pans and fires aplenty, nested endlessly within each other.

Hero Harry Blakey, brave but ignorant, soon falls into the clutches of the greatest brigand of them all, the Diamond Contessa, and her hordes of bestial aliens. He escapes, fights back, escapes again, and fights again. He develops a most intimate acquaintance with frying pans and fires, and he never, never wonders what it all means. Nor does Bulmer.

Contessa is an action story, and nothing but. It is good enough in its own simple terms, though Laumer has done it better. Still, a wise man once said that the unexamined life is not worth living. He might have added that it's not much worth writing about either.

Gregory Kern's **The Galactiad** is no improvement. Here super-aliens come to this galaxy from afar, and for their superior amusement announce that if humans fail to win the interspecies Olympics, Earth will be destroyed. If we win, they will leave us alone.

The challenge is impossible. Humanity has few allies, and it is hardly the most athletic of species. And its opponents would be delighted to see it go down in flames. In fact, its opponents are perfectly willing to sabotage Earth's athletes to guarantee the planet's destruction.

But humans have one supreme talent—they are just great at skullduggery. The alien schemers don't stand a chance. Nor do their athletes, and like *Contessa*, the story works itself inevitably out while the author turns a well-worn crank.

Timothy Zahn's **The Blackcollar** also owes much to traditional machinery, but it has more originality than the Kern or Bulmer books. Here, Earth and its worlds have lost a war to a race of fast, strong, warlike aliens, the Ryqril. Now the Ryqril ensure human loyalty with careful conditioning and absolute power. Nevertheless, some men do dream of rebellion. They know that once humans had their own superwarriors, the Blackcollars, trained and drugged

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and equipped to fight the Ryqril on their own terms. They know that though the Blackcollars were disbanded after the war, they still exist, and they know of a cache of warships.

Allen Caine leaves Earth to seek the coordinates of the cache. Stranded when the rest of his cabal is captured, he seeks out Blackcollars and mounts a fresh rebellion. In the end (of course) he wins, and humans can glimpse a new age of freedom. However—and here Zahn departs from the machinery—the victory is not total and it does not owe all to human potency. There is more realism here, and hence more satisfaction. At the same time, Zahn has a more convincing way with the action. He's a far better buy than either Kern or Bulmer.

A. Bertram Chandler has the SF monopoly on the machinery C. S. Forester (and his imitators) used to turn out his Hornblower yarns (and their imitators). Hence his stories of John Grimes adrift on the waves of space have a freshness often lacking elsewhere.

Matilda's Stepchildren is no exception. Grimes has chartered his solid-gold ship, *Little Sister*, to a muckraking reporter, Fenella Pruin, of unlovely temper and greedy ill nature. Their destination is New Venusberg, where rumor has it that you can buy anything. You can gambol in casinos, beds, and snuff parlors. You can hunt, fish, eat, swim, and torture.

Fenella's goal is to expose the truth about New Venusberg for her scandal-loving tabloid. Unfortunately, snuffery and torture need victims, and Grimes and Fenella promptly fall in line for those choice positions, along with a sexy pair of Matilda's Stepchildren, enslaved descendants of kangaroos. Grimes then pulls off an escape to the wilderness, where they meet more Stepchildren and find their way back to safety.

What saves the book from being the yard goods its synopsis announces is Chandler's saucy touch with human nature, venality, sensuality, and sex. He is never even faintly obscene, but he does appeal to the frustrations of being human.

And here is Alan Dean Foster once more, with **The Man Who Used the Universe,** a tale that gains greatly from the utter inhumanity of its human protagonist, Kees vaan Loo-Macklin, a schemer to shame Machiavelli and Nixon. Kees starts life as a highly intelligent, dispassionate criminal who, when his boss decides to kill him, turns the tables, takes over the syndicate, and soon runs the underworld of a planet. He branches out, alarms offworld competitors and rulers, and lets himself be bought out. He goes legit, builds a business empire, and undertakes such fine good works as clearing his home planet of its intolerable smog. And then he joins his fortunes to an alien enemy who believes it owns a traitor.

Is he a traitor? The question stays live, for though he has told the human rulers he is plotting to destroy the aliens, he tells the aliens he is working to allow their takeover. Whatever the truth, he knits two species together within his empire, and when a third appears full of belligerence, Kees's two peoples stand ready to prevail. Villain and hero, he is always cold, calculating, and loveless. He is always working to his own purpose, always trying, simply, to keep his life under his own control.

Foster treats Kees as if his purpose is rare, malign, inhuman. Certainly he has the other characters treat Kees so. But I suspect Foster is trying to remind us that we all act in just this way. We

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all try to "stay on top of things," to "get a grip on things," and so on. We design our lives, choose our careers and friends and environments, to bolster our feelings of control. We even so choose our politics and ideologies, for isn't self-determination the point of democracy? Don't Americans control their own lives? (Or do they merely deny the illusion that they are controlled?) Foster's point may be that Kees is unique only in his awareness of his goal, and that this knowledge enables him to achieve that goal far more effectively than his fellows can dream of doing.

Let me close this column with brief mentions of three anthologies edited by Isaac Asimov, Martin Greenberg, and Charles Waugh. They are:

Starships, a compendium of thirteen stories dealing with the complements and types and events of starships, starring Cordwainer Smith, Sheckley, Buck, van Vogt, McCaffrey, Asimov, Saberhagen, and more.

Caught in the Organ Draft, twelve stories dealing with biology, starring Fredric Brown, Bradbury, Anderson, Silverberg (the title story), Le Guin, and more, ending with a set of more or less useless "Notes" commenting on the stories.

Hallucination Orbit, twelve for psychology, starring Bixby, Dahl, Westlake, Silverberg, Asimov, Kuttner, Saberhagen (the same story is in *Starships*), Brunner, and more, with useless "Notes."

They're all theme anthologies, full of fine, classic stories, and just great for the library market. Would an individual SF reader want them? That's up to you. Are you gaga for starships, organ transplants, or hallucinations? Or do you know a psychologist or a biologist, a Trekkie or a Jedi fan, who needs an introduction to the right stuff? ■

ON GAMING

(continued from page 107)

A stasis dome is the ultimate defense developed by the Humans. It's a force field about fifty meters in radius. Nothing inside the dome can move faster than 36 miles per hour—slower than an arrow's flight. Lasers, heat, and radiation cannot penetrate it, although a soldier can step through it without effort. Troops inside the dome must fight with more primitive weapons such as swords, knives, etc.

Combat is straightforward. Assuming you can see the target, you add the total attack points and compare it to the defense points of the target. This gives an odds ratio, such as 1-1, 2-1, etc. Two dice are rolled, with one of three results: the target is missed (no effect), pinned, or eliminated.

Pinned units may not move or fire. They become unpinned if they rally on a morale roll. This is when officers are helpful. Fighting continues until the objective is achieved—which is usually to eliminate the other side.

As a game, *The Forever War* captures much of the "feel" of the book's adventures. One nice touch: the rules are interspersed with quotes from the novel that relate to the aliens, weapons, combat, etc. This makes for more interesting reading.

Even is you're unfamiliar with the novel, you'll enjoy the game. It's highly recommended.

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brass tacks

Dear Dr. Schmidt:

Just a note in praise of "The Geometry of Narrative" (August 1983). In addition to being a delightful intellectual puzzle, it is also—and sadly—first-rate reporting. You may get some hate mail from some of my colleagues in the humanities at the author's portrait of a graduate seminar in literary criticism; but be assured that Hilbert Schenck's depiction of the student-browbeating, mousetrap-setting Professor Stang is accurate, cruel, and morally just. Write on, Mr. Schenck, write on.

PAUL A. CARTER

Tucson, AZ

Dear Dr. Schmidt:

In view of the quality of intelligence I expect from *Analog*, which I have always assumed was written by intelligent people for intelligent people, I was appalled by your editorial "Drug Abuse" (June 1983). No one is going to argue the point that there is something very unstable about mass poisoners. However, for an editor of *Analog* to proclaim so incredibly self-righteously and smugly that "Those people are *nuts*," is painful, to say the least. It is apparent that you have never had any experiences in your circle of family or friends with "crazy" people. You even mock the term "sick." Has anyone ever gently steered you toward thinking of these people as *mentally ill?* Evidently not. No one with a modicum of intellectual sensitivity goes around calling people *nuts* anymore.

Of course these people can't be allowed to exhibit their illness to society; but let's make one thing very clear. These people are not happy folks, and they do not rationally decide to kill others. They are as tormented by their personal, internal hells as a human can be and still live. Have you ever been psych-

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ically tormented like this, Dr. Schmidt? I think not, unless you have been medically diagnosed as mentally ill. Psychiatrists can tell you it is a living hell. After all, there is no place to run from the demons of your own mind. All these people need now is your bigoted labels.

You speak of these people as "parasites." They "endanger others, consume resources, and contribute nothing," in your words. Now let's ignore the small fact that not all parasites endanger others, and look at the basic thought of individual contribution. Who are you to flatly state that "they contribute nothing." Is it presumptuous of me to ask how you know this? Do you know all these "nuts" personally? Could it possibly be that they "contribute" as much as you, Dr. Schmidt? And so comes the question—What the hell do *you* "contribute"? Here we have a nice, slick magazine that is avidly read by its fans for entertainment. Entertainment? Is that a contribution? Certainly not in the manner of discovering new resources, new medicines, new cures, new technologies. And none of us writes our Ph.D. dissertations using *Analog* as a reference. So just where is your all-important contribution, Dr. Schmidt? I wonder. Could you be considered a "parasite" also? I do assume that you consume resources, and so far we haven't found that you contribute anything to society that can't either be done by others or done without. (Oh, before you say it, I agree that mental stimulation by reading fiction is pleasant, but *not* mandatory for the continuation of society.)

I totally agree that prisoners should work if at all possible and earn their keep. I believe that many prison systems are set up this way. This point makes up only a small portion of your diatribe, however.

Come down off your conceited high horse, Dr. Schmidt, and recognize that other people may be doing the best they can under mental circumstances about which we can only speculate. Of course they need to be put away, but do they need to be browbeaten about conditions over which they have no control? Don't be so quick to sling pejorative, childish terms until you have experienced either first hand or second hand some of the agony of the mentally ill.

MARILYN S. DURHAM
P.O. Box 263
Prairie Grove, AR 72753

According to my dictionaries, my editorial was not a diatribe, but your letter is a real textbook example; and a parasite does, by definition, hurt its host.

I do sympathize, strongly, with the mentally ill. My rabid-dog analogy was chosen very carefully, and I hope you will make some effort to understand its full significance. I did not *mock the term "sick," though I do object to its abuse by people who use it to excuse virtually any action, even in cases where it has no real clinical significance. The currently fashionable fear of words which express unpleasant truths without concealing them has done a good deal of damage. Even if a particular individual's homicidal tendencies have a genuine pathological basis, let's not pretend there's no important difference between them and the common cold. Of course I don't know* all *these "nuts" personally—but I've come into contact with enough to believe that the word has an important place in the language, whether you or I like it or not. I will not apologize for using it when it fits.*

The notion that a "contribution" doesn't count unless it's on the level of a cancer cure is entirely your invention and has absolutely nothing to do with anything I said. I pay for the resources

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I consume, and I trust you do, too; that's all either of us can legitimately demand of anyone. But we can *demand that, and the parasites I was talking about are people who don't meet that requirement. There may be exceptions still on the outside, but idle prisoners fit the definition perfectly.*

Dear Mr. Schmidt:

I enjoyed your editorial "Drug Abuse" in the June issue of *Analog,* but from my position as an administrator for the past eleven years in a large medium-security state prison I can tell you; with a great deal of certainty, that there is no way inmates can be made to be even partly self-supporting under today's laws.

A complete explanation of this is too lengthy to be given here, but it hinges on the legal assumption that incarceration by itself is sufficient punishment, and that an inmate does not have to go to work at all, go to "school," or even bathe.

You wrote a thoughtful editorial and have a better grasp on reality than most people do, but lack the necessary background to understand or even know of the constraints we work under and the crazy "Alice-in-Wonderland" world that prison life is.

Thank you for the editorial because it may stimulate some constructive thinking among a readership that normally does not consider these mundane matters.

NAME WITHHELD

Dear Stan,

You've used *Analog*'s pages to run some strongly pro-nuclear power articles in the past. I wouldn't go so far as to advocate equal time for Luddites, but may I remind you that rational arguments against N-power *do* exist?

Two facts stick out in my mind:

1. A nuclear power plant takes eleven years to construct.

2. All major industrial projects are built with borrowed money.

I determine these data the only way anyone can learn anything: *by observation.*

Therefore, the cost of a nuclear plant may be stated thus: $C_t = C_e (1 + i)^t$.

In this equation, C_t represents total cost; C_e is the cost estimate (actual money paid out), i represents the interest rate on the loan, and t the time in years. If we assume eleven years' time for construction and borrow at the rate of 12%, then: $C_t = C_e (1 + .12)^{11}$, or about $3.47 \times C_e$.

Please bear in mind that 12% is *very* cheap money, considering recent fluctuations in the Prime Rate . . . and remember as well that the eleven-year cycle assumes the project will be completed on time—which can be a risky proposition!

Case in point is the South Texas Nuclear Plant near my home town in Corpus Christi. In this case public opinion didn't kill this plant (local townspeople favored it, figuring it would make their community prosper), nor did the Fondaites camp on the door and bury the project in litigation. Yet the project is in deep trouble, and here's why:

Originally proposed in 1972 at a cost of $1.2 (all dollar figures in billions), STNP looked good enough on paper. By the time ground was broken and blueprints were drawn up, this figure was pushed up to $1.6; no sweat.

By 1978 $2.2 had already been spent and the end was nowhere in sight. The contractor's original figure was revised to the neighborhood of $2.8 a year later, and about this time those paying the bills fired the original contractor and instituted lawsuits exceeding $2 x 10^9. At question was whether the work on the

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plant was properly done; in heavy industry, re-work is *very* expensive.

A new contractor was hired thereafter, who allowed the plant *might* be completed for $3.2. After surveying the mess, he revised this figure to $3.6. Currently, I read that $4.2 has been spent thus far, hopefully to put the plant on the line sometime in 1986; total cost (based on past experience) ought to be somewhere in the neighborhood of $6 billion.

A nasty break . . . but it doesn't end there.

Six billion dollars accrue interest at the rate of $720 million a year . . . a rather tidy sum! Furthermore, this loan has to be amortized over a period of years, so we're realistically looking at $1 billion a year, off the top, *just* to keep the banker happy!

If that plant runs at anything less than peak capacity (which is likely, if allegations regarding its slipshod construction ring true), its owners are in the same position as a quarterback at fourth-and-twenty: they'll punt, and when business does this it's called "bankruptcy."

There's the tale of the numbers—and bear in mind that the numbers don't lie! Nuke power looks like neither the Horn of Plenty which Jerry Pournelle postulates, nor the worst of Jane Fonda's nightmares come true. The actual tale of the tape will cast nuclear power in the same light as the Franco-British *Concorde*: Ultra-high-tech and state-of-the-art . . . but it rolls off the assembly line economically obsolete.

That's poetic justice for you; I note (also by observation) that history usually doesn't listen to the prognostications of philosophers—it stubbornly follows its own head, usually evolving along a bland middle course.

And I'm surprised that these figures never come to light amidst all the flap over nuclear power; by this I am forced to conclude either that the Luddites don't have the patience to multiply 1.12 times itself eleven times over . . . or can't afford a good twenty-dollar pocket calculator.

DAVID A. ROACH

Corpus Christi, TX

Dear Stan,

As many of your readers pointed out, "Proposal For A Proposal" in the July 1983 issue was excerpted from "engineering folklore." It was part of a collection of such folklore I put together that's still looking for a home. In folklore collections of this sort, the collector is usually listed as the "editor." I first ran across the "proposal" piece about 1974 when I was marketing manager for an electronic instrument company in Phoenix. I've been collecting such technical humor since 1950. It's difficult, if not impossible, to find the original author of any of it. There's only one collection of similar folklore of which I'm aware: "A Stress Analysis of a Strapless Evening Gown," published back in the 1950s. I made the mistake of loaning my copy to someone. If anybody has a copy of this classic they want to dicker over, I'd like to hear from them. As a matter of fact, I'd like to hear from anyone who'd like to exchange tidbits of such techno-scientific folklore.

G. HARRY STINE

Dear Dr. Schmidt:

Rick Norwood's difficulties with teaching some students to work written problems in math typify the experiences of many teachers in many disciplines. But the cause of these difficulties is not lack of intelligence on the part of the students. Any one of those students would likely have no trouble figuring

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how long it would take him to travel from Detroit to Cleveland in a car averaging 55 mph if he were the one actually about to make the trip. Written problems in math are hypothetical, nonimmediate. They can only be understood through use of the mental power of analogy. Unfortunately the modern educational regimen does not address the human need to learn to use the power of analogy. Children are left to develop it spontaneously or not, as they will. They are given no help in learning how to draw parallels, how to discriminate between valid and invalid parallels, how to generalize, and how to reduce a generalization to specific application. This is a tragedy, for the power of analogy is the most important mental power humans have, one that is essential for everyday living and without which we can only be miserable, lurching from crisis to crisis to disaster.

Modern educational methodology is only *slightly* better than the way our early simian ancestors taught their young —with grunts and shrieks, cuffs and slaps. The difference is that for the most part we no longer cuff and slap. Our teachers do little more than lecture and give tests of recall, and our young are supposed to become educated that way! Students are given no guidence in developing their mental powers. What they need is active training, not passive indoctrination. I maintain that anyone who has ever become truly educated has done it despite the modern educational regime and teaching methodology, not because of them.

You do not teach a child to read by lecturing to him. He learns by doing, with guidance. This is the way that children should be taught *everything* —including factual material. Give them something fulfilling to do that will create in them a felt need to learn, and help them to learn whatever they then seek to know. The school years can be creative years. Children can produce things of real worth. In the process, all the faculties and powers of their minds will be developed.

If this teaching methodology were followed in our schools, we would discover that everyone born with "normal" intelligence possesses the potential for being what we now term a "genius." We are all, every one of us, at least 50 and perhaps 100 I.Q. points below what we could have been had we been educated the way we truly needed. Someday we will learn to educate our young the way they need to be educated, and human existence will be transformed far for the better because of it.

RONALD R. LAMBERT

Troy, MI

Gentlemen:

[In the December "Reference Library] Tom Easton complains that [Dr. Jeffrey M.] Elliot is not "as punctilious a scholar as he might be—Coblentz died long enough before publication that Elliot should have squeezed in a note to that effect." Easton failed to see the following (middle of page 33—Introduction to the Coblentz Interview): "Sadly, as this book goes to press, Stanton A. Coblentz lost the fight for his life in a Monterey, California, hospital, having been struck down without warning by a debilitating stroke in June of 1982, just days after finishing his autobiography [with Dr. Elliot]. This interview is the last he gave. Stanton A. Coblentz died Thursday, September 9, 1982. . . . Dr. Elliot presented the essay/interview in question as a final tribute to a fine author and a gentleman.

R. REGINALD

Publisher, Borgo Press

San Bernardino, CA ■

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a calendar of analog upcoming events

20–22 January
RUSTYCON (Seattle-area SF conference) at SeaTac Hyatt House, Seattle, Wash. Guest of Honor—Robert Asprin; Artist Guest of Honor—William Warren, Jr.; Fan Guest of Honor—Jerry Kaufman. Registration—$18 at door. Info: Rustycon, Box 47132, Seattle WA 98146.

27–29 January
CORFLU (fanzine-oriented convention) at Claremont Resort Hotel, Berkeley, Cal. Guest of Honor—to be chosen at convention; TM—Terry Carr. Registration $24.31 (including banquet). Info: CORFLU, 263 8th Avenue, San Francisco CA 94118.

27–29 January
GENUINE CONFUSION (Ann Arbor-area SF conference) at Plymouth Hilton, Plymouth, Mich. Guest of Honor—Mike Resnick; Fan Guest of Honor—Martha Beck; TM—Dick Smith; Friday Night Speaker —Wilson Tucker. Registration—$12 to 15 January, $15 at the door. Info: Ann Arbor SF Association, Inc., Box 2144, Ann Arbor MI 48106. 313–485–4824.

30 January–2 February
General meeting of the American Physical Society at San Antonio, Texas. Info: A.P.S., 335 E. 45th St., New York, NY 10017.

17–19 February
BOSKONE XXI (New England-area SF conference) at the Boston Park Plaza, Boston, Mass. Guest of Honor—Gene Wolfe; Official Artist—Vincent DiFate; Special Guest —David G. Hartwell. All the usual plus more. Registration—$15 until 14 January, $20 at the door. Info: Boskone XXI, NESFA Inc., Box G, MIT Branch PO, Cambridge MA 02139.

17–19 February
CLIPPERCON (media-oriented SF conference) at the Hunt Valley Inn, Cockeysville, Md. Guest of Honor—Nichelle Nichols; Allen Asherman, Howard Weinstein. Registration $25, banquet $20. Charity auction, etc. Info: ClipperCon, c/o Marion McChesney, 3429 Chestnut Avenue, Baltimore, MD 21211.

24–26 February
WISCON (Madison-area SF conference) at the Inn on the Park, Madison, Wis. Guests of Honor—Jessica Amanda Salmonson and Elizabeth A. Lynn. The usual plus "Women Warriors in Art and History." Registration—$11 until 1 February, $16 at the door, $5 supporting at all times. Info: SF3, Box 1624, Madison WI 53701–1624. 608–251–6226 (days) and 608–233–0326 (evenings).

27 February–1 March
Compcon Spring 84: "Intellectual Leverage—The Driving Technologies" at San Francisco, Cal. Info: John Wakerly, Computer Systems Lab, Stanford University, Stanford, CA 94305. 415–856–0169.

30 August–3 September
LA CON II (42nd World Science Fiction Convention) at Anaheim Convention Center, Los Angeles, Cal. Guest of Honor—Gordon R. Dickson; Fan Guest of Honor—Dick Eney; TMs—Robert Bloch & Jerry Pournelle. Registration—$40 until 31 December 1983, more later and at the door. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: LA Con II, Box 8442, Van Nuys CA 91409.

—ANTHONY LEWIS

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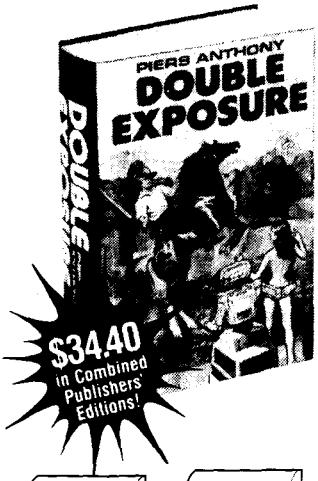

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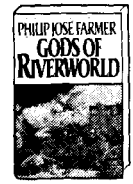

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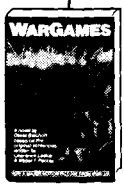

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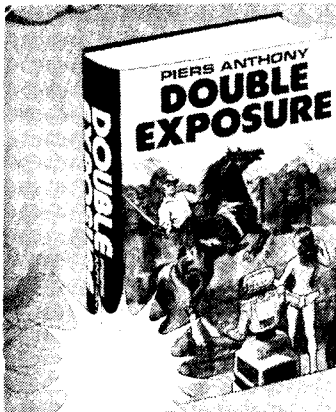

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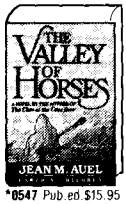

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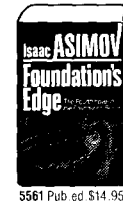

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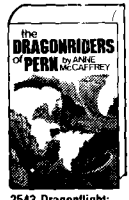

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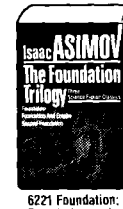

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